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THE CHILDREN'S KRAFT SHOP

INVENTED, WRITTEN AND ILLUSTRATED
BY
ADELIA BELLE BEARD

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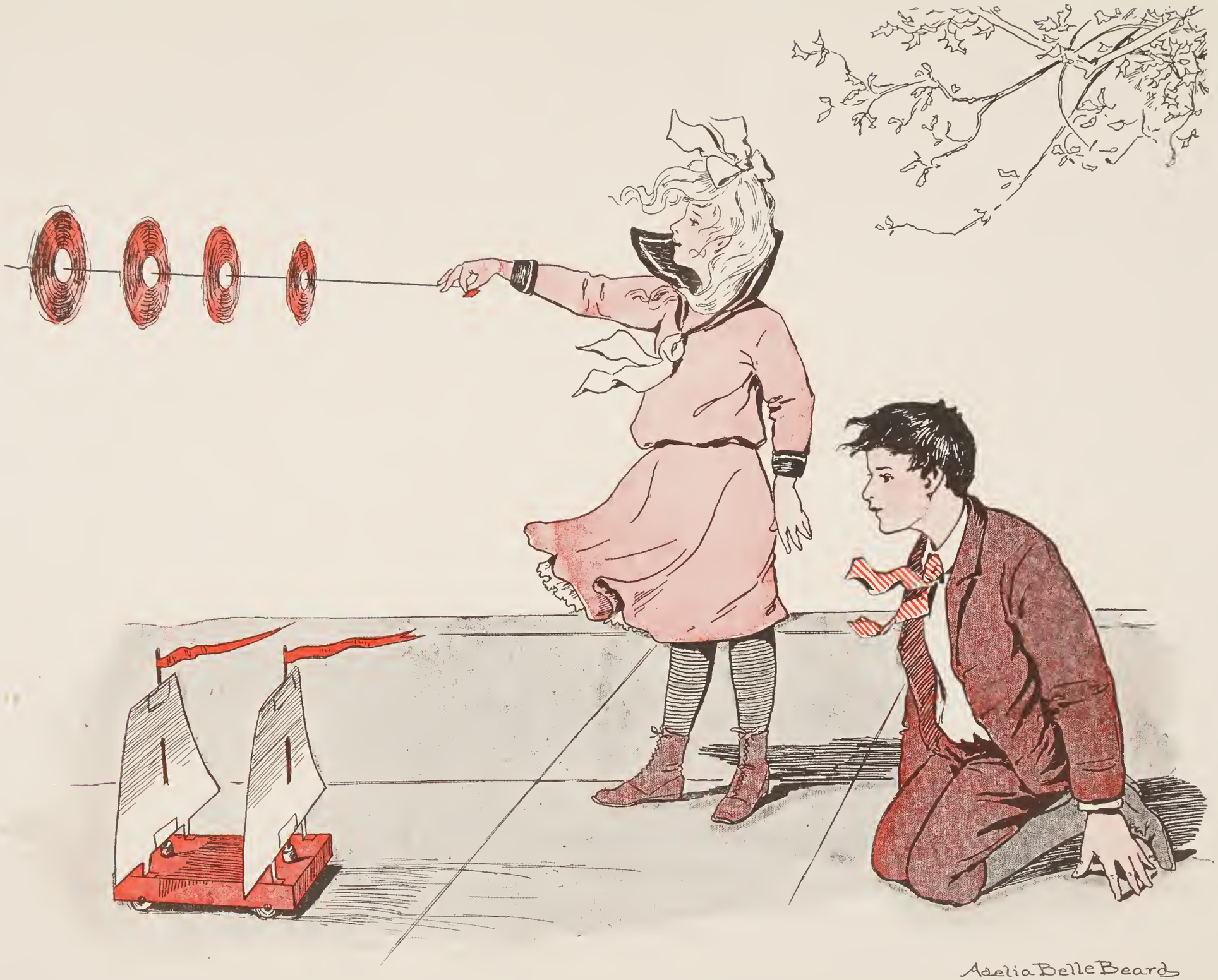
FOREWORD TO MOTHERS

INTRODUCING THE CHILDREN'S KRAFTSHOP.

We have endeavored to open a new and useful field of simple handicrafts for little folk, giving them an original line of toys and a new line of materials with which to make them. We hope the children will have a great deal of pleasure in making toys of such things as empty spools, sticks of kindling wood, wooden clothespins, natural twigs, old envelopes and newspapers, and in this way to encourage resourcefulness, originality, inventiveness, and the power to do with supplies at hand.

Everything described in the book has been invented by the author, and made by such practical and simple methods that a child's mind can grasp them, and a child's hands be easily trained to manufacture the articles.

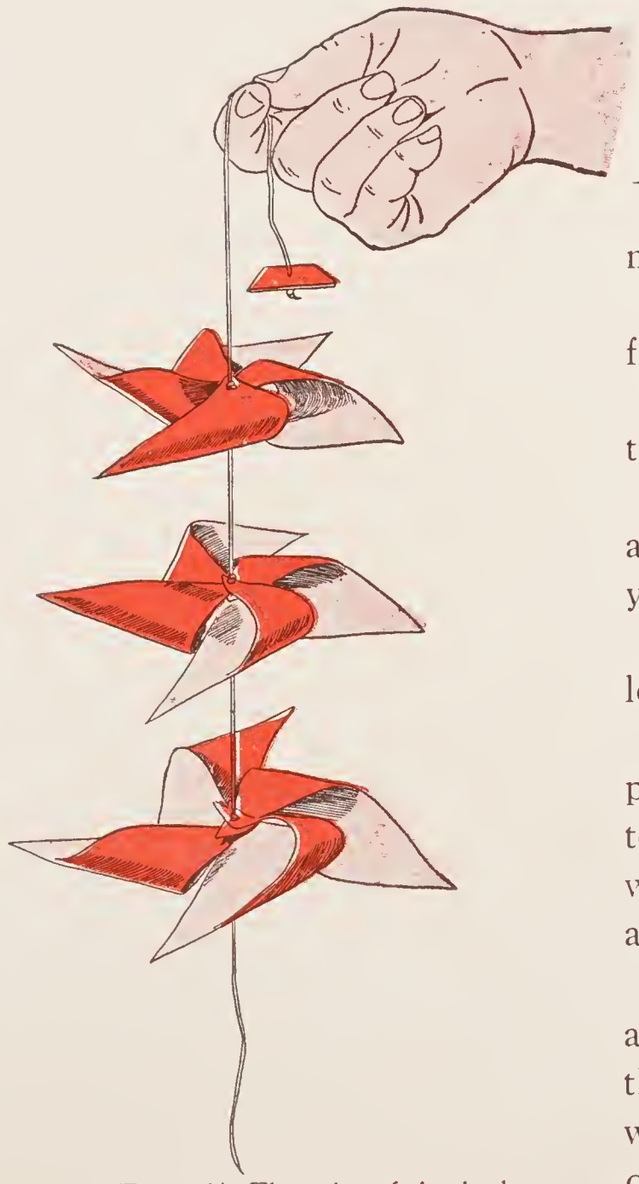


Asella Belle Beard

Making Wind Toys

By Adelia Belle Beard

One of the Authors of Things Worth Doing



(Figure 4.) The string of pinwheels

IT WAS the windy weather that suggested the new toys to the children. "Suppose we try pinwheels," said Polly. "Not the old kind on sticks that we used to make, but we can have them different somehow, and this wind will make them spin like mad. Donald, I just *must* have pinwheels."

Polly's enthusiasm inspired Donald. "We can make a windmill with a pinwheel for the big wheel," he said.

"Oh, yes," chimed in Polly. "You do that, and I will make a string of pinwheels that will not need sticks, or pins either. What shall we make them of?"

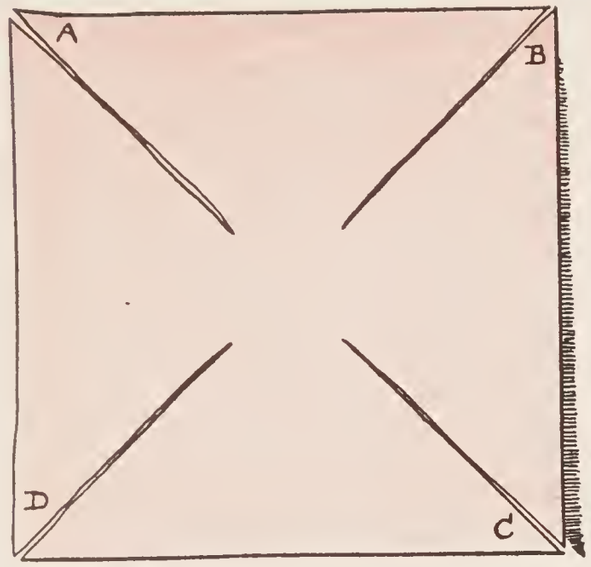
"Stiff writing paper is the best," replied Donald. "Here is our best pad," he added, taking from the table drawer a large pad of good quality writing paper. "Do you think we ought to use it?"

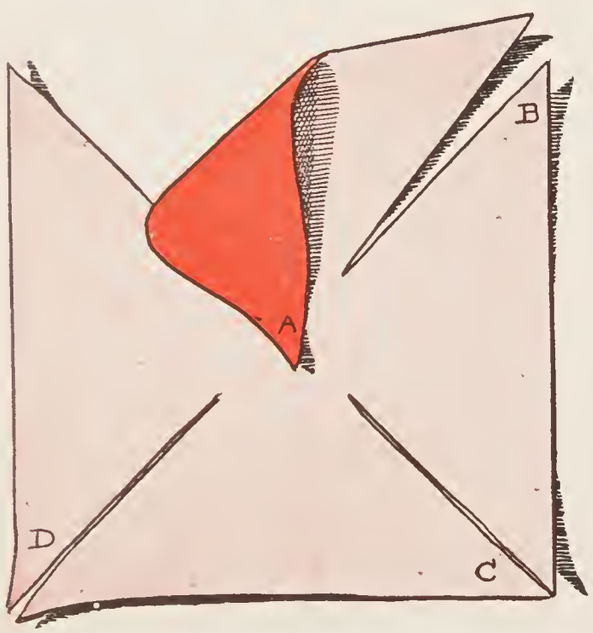
"Why not?" said Polly. "Mother says we are learning lots of things in our Kraft Shop."

Donald had no further scruples about using the paper, though he was careful not to waste it. "I am going to make the tower for my windmill of this heavy manila wrapping paper," he announced. "It is nice and smooth and plenty strong and stiff enough."

"I would," Polly answered absently, as she folded and slashed the squares for her pinwheels. "I'll have them graduated," she continued, thinking of her own work; "first a large wheel, then a smaller, then a smaller one still, and the last shall be smallest of all."

(Figure 3.) The way the thread goes through





(Figures 1 and 2.) First steps in making pinwheels

For her largest wheel Polly cut a square of writing paper, which measured exactly six inches along each edge. The next she cut five and a half inches square, the next four and a half inches square and the smallest three and a half inches square. Then she placed her ruler across the largest square diagonally from the upper right-hand corner to the lower left-hand corner and ran her pencil along its edge. This gave her a diagonal pencil line from corner to corner on her square. Again she placed her ruler across the square, this time from the upper left-hand corner to the lower right-hand corner, and drew a line along its edge, dividing her square into four equal triangles. After this she drew the same kind of lines on the three other squares. With her scissors she cut slashes along each line on each of the squares to within three-quarters of an inch of the center. (Figure 1.)

Lifting the upper left-hand point of the large square (A, Figure 1), she brought it to, and overlapped, the center of the square (A, Figure 2), curving, not sharply bending the paper. The point B she brought also to the center, overlapping the point A. She did the same with C and D, C overlapping B and D overlapping C. When all the four points met at the center Polly ran a large needle, threaded with a long, soft, white cotton string, through the center of the wheel at the back and out through the overlapping points in front, taking care that the needle passed through every point. Then she drew the needle up until the back of the pinwheel rested against a knot which was tied about six inches from the end of the string and, allowing almost one inch of string for the wheel to turn on, she tied another knot in front of the wheel, to hold it. Between the two knots the wheel could whirl, but could not move out of place.

Six inches above the last knot she made another knot and then strung the next largest pinwheel on the string and fastened with a second knot in the same manner as the first wheel. In this way all four were put on the string, each six inches from its neighbor, and then there remained half a yard or more of free string above the last wheel. On the free end of the string Polly fastened a small square of pasteboard by pushing the needle through the center of the square and tying a large knot at the extreme end of the string to keep the pasteboard from slipping off. (Figure 4.)

"The wind can't pull the string through my fingers when I hold it by this pasteboard square," she said, and almost before the last knot was tied Polly was at the window. "Come quick, Donald, I am going to try my pinwheels," she cried, throwing up the sash and putting out the hand that held the end of her string.

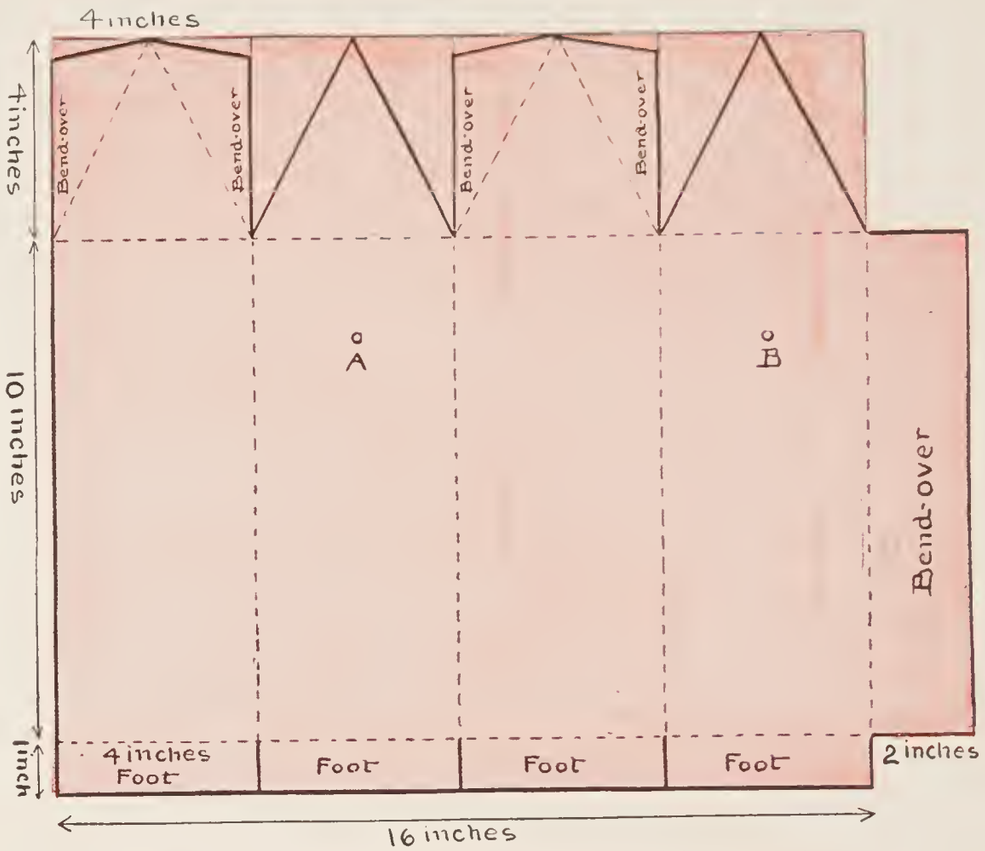
Donald dropped his windmill and gained the window at a bound, as anxious as Polly to see the result of her experiment. Immediately the wind caught the string of pinwheels, lifted it out straight and sent each wheel whirling at a great rate.

"How they do go!" Donald exclaimed. "Now come and help finish the windmill. You make the wheel while I get the tower in shape."

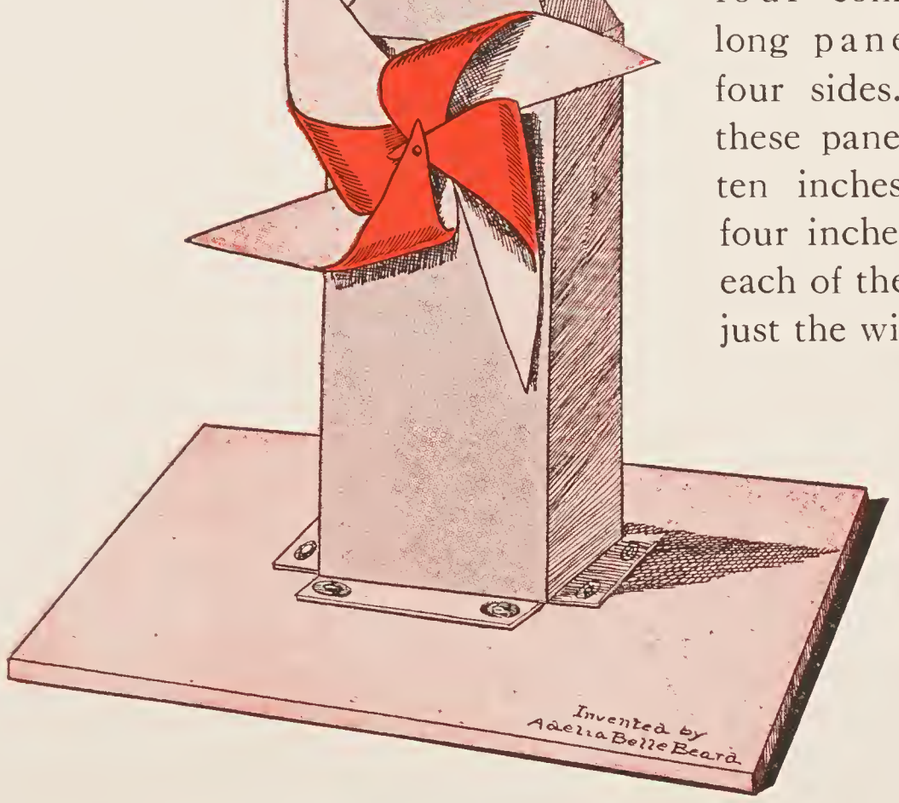
"All right," said Polly cheerfully. "How big shall I make the wheel?"

"About six and one-half inches square."

Donald made the tower for his windmill all in one piece. (Figure. 5) He first decided upon the height and width, then drew four connecting oblong panels for the four sides. Each of these panels he made ten inches high and four inches wide. For the peaked roof he drew four more panels, one above each of the side panels. These he made four inches high and four inches wide, just the width of the side panels. Exactly at the middle of each top line of each roof panel he made a dot with his pencil, then drew slanting lines from the ends of the base of each roof panel to the dot at the top. This gave four points for the roof. (Figure 5.)



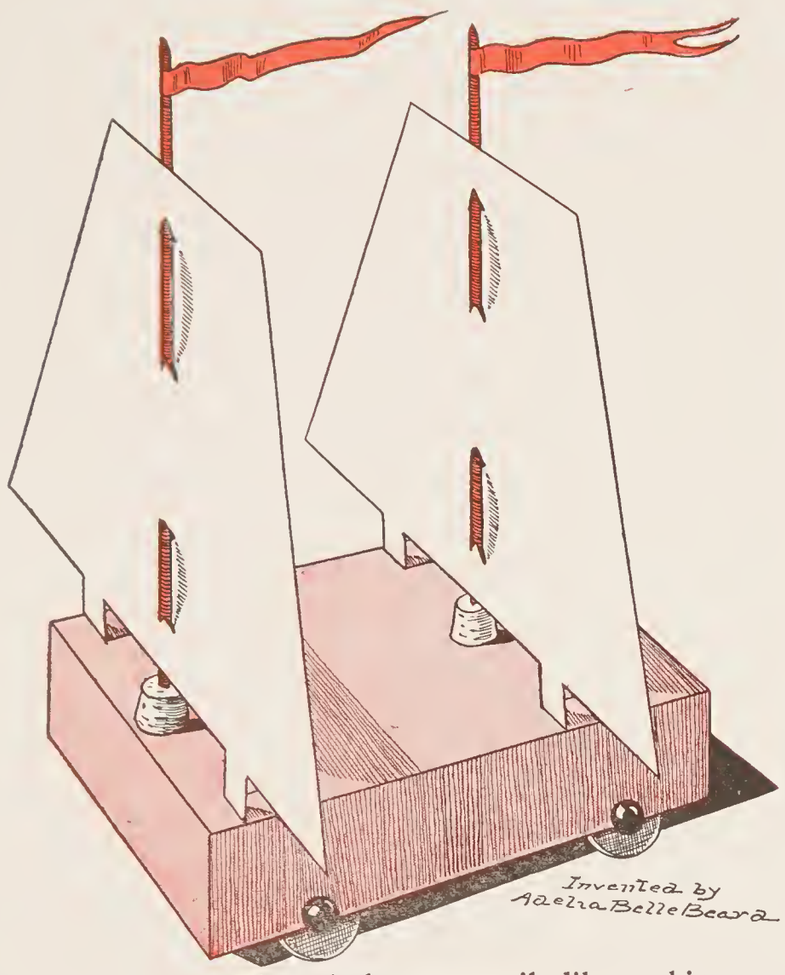
(Figure 5.) Donald made the tower all in one piece



(Figure 6.) It looks like a real windmill

The laps, or feet, for the tower to stand on, Donald made by drawing a horizontal line just one inch below the lower edges of the side panels and bringing the side lines down to meet it. The bend-over, attached to the fourth panel, which holds the tower together, he made two inches wide and exactly the length of the side panels.

This finished the drawing and Donald proceeded to cut it out. He cut along the slanting lines of the second and fourth points of



(Figure 7.) The wind wagon sails like a ship

the roof, but on the first and third points he left bendovers, as shown in Figure 5, simply cutting off some of the top of the two squares to make the bendovers fit under the other two points. Just two inches below the top line and two inches from each side line of the second and fourth side panel Donald punctured two small holes. (A and B, Figure 5.) These were for the wheel rod. He then slashed the lines which separated the feet at the bottom of the side panels and bent the tower in shape according to the dotted lines in Figure 5. The feet he bent out, the roof he bent in, the sides he bent in, and each bend he creased sharply to give a smooth, even edge. With good glue he fastened the bendovers of the roof to the under side of the cut-out points; then he glued the side bendover to the outside of the first panel and his tower was finished.

Polly had completed the wheel for the mill, making it as she did her pinwheels, with this difference: instead of a string to hold the wheel together she used a strong pin and put it through from the front, piercing the laps before running it through the center of the wheel.

"Are the little holes to hold the stick for the wheel, Donald?" she inquired.

"Yes; I wish you would find me a good stick, Polly, while I tack the feet of the tower to a piece of board."

Donald used two large-headed carpet tacks for each foot, and, to prevent the sharp edges of the heads from tearing the paper, he cut little rounds from an old kid glove and pushed one round up on each tack before tacking the tower to the board.

"Will this do?" asked Polly, holding up the slender handle of an old paint brush.

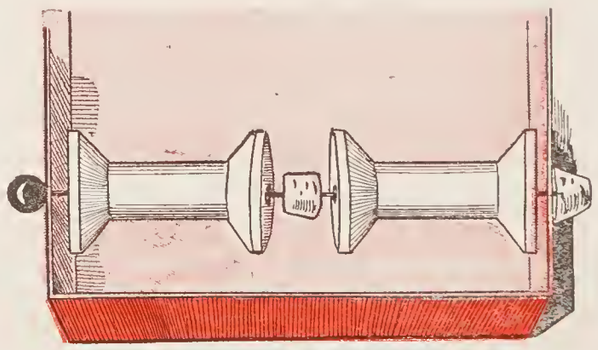
"Just the thing," said Donald, pushing the pointed end of the stick into the hole A in the front of the tower and out through the hole B at the back.

Donald forced the point of the pin that held the wheel into the blunt end of the wheel rod which extended out one inch beyond the hole A at the front of the tower. Then, to hold the rod at the back he pushed a cork onto its pointed end.

"Now for a wind wagon!" cried Donald.

"Won't a box do for the wagon part?" Polly asked, "and—"

"Spools for wheels," broke in Donald.



(Figure 8.) This is the way Polly fastened the wheels on the wind wagon

"Hatpins for axles," added Polly.

"Four wheels and corks between to keep them apart," said Donald.

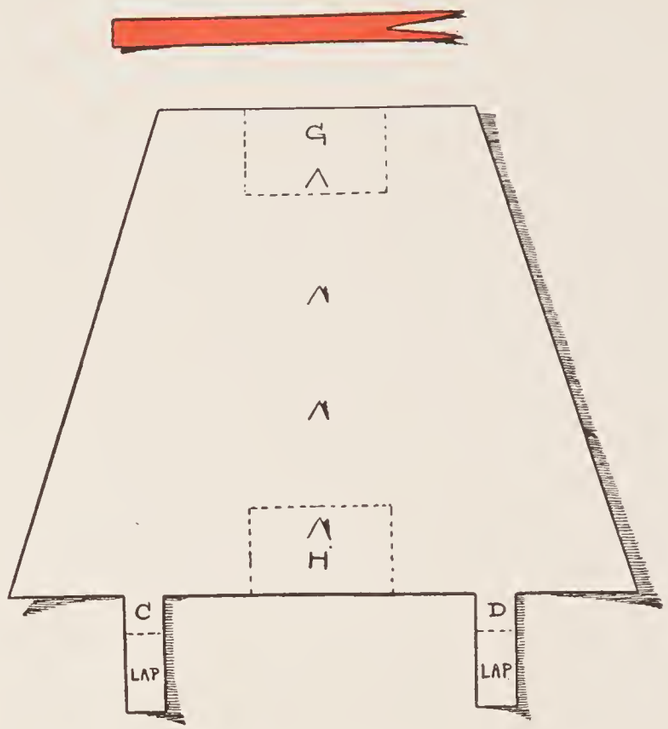
"I am going to use this pasteboard letter-paper box," said Polly.

"Well, tell me how wide and how long it is, so that I can make the sails to fit."

Polly measured the box. "It is a little over six and one-half inches long, five inches wide and one inch and a half deep," she announced.

"Be sure your spools are all the same size," Donald said.

Polly begged two hatpins of her mother. One was long, the other short. The shortest was just the right length for her axle, so, using a pair of nippers, she broke the longer pin off at the point to match the short one. Then she pushed one pin in on one side of the box a quarter of an inch from the edge and one inch and a quarter from the end. On this pin, inside of the box, she strung a large spool, then a small cork, then another large spool and finally pushed the point of the pin through the other side of the box exactly opposite to where it entered the first side. On the point of the pin she stuck a small cork for a hub. The round head of the pin answered for the other hub. (Figure 8.) The other two spool wheels were adjusted in the same manner and the last pin was inserted in the box the same distance from the back end and edge as the first pin was from the front end and edge.



(Figure 9.) Donald made the two sails like this

Figure 10. A twig for a mast

Donald cut both of his sails like Figure 9, making them eight inches wide at the bottom, four inches wide at the top and six and one-quarter inches high. He drew a line directly through the middle of each sail from top to bottom, and on this line he cut four small points at equal distances apart for openings to admit the masts. He made two braces at the bottom of each sail, four inches apart, to hold them steady. (C and D, Figure 9.) Each brace is half an inch wide, half an inch high, and has a lap at the bottom one inch long.

When the sails were ready he erected his masts. These were slender, straight twigs, nine inches long, sharpened to a point at each end. The front mast he placed half an inch from the front edge of the wagon, the back mast one inch and a half from the back edge of the wagon, and both directly on a line drawn lengthwise through the center of the box. Donald first punctured small holes in the box at these points, then forcing a half-inch cork up one inch on the lower end of the front mast (E, Figure 10), he covered the bottom of the cork with glue, and inserted the end of the mast in the hole at the front of the box where it was a tight fit.

When he had pushed the mast down until the glue on the cork held it fast, he covered the top of another cork with glue (F, Figure 10), and forced the last cork up on the mast from the under side of the wagon until it stuck to the top. When the glue dried the mast was firm and steady.

The sail Donald slipped onto the mast from the top, running the mast in and out of the holes, as shown in Figure 7. He bent the laps back at the dotted lines and glued them to the top of the box. Then to make the sail still more secure he pasted oblongs of paper over the masts where they ran through the sails at the back. The dotted inclosures, G and H, show the positions of the oblongs on the sail.

When the second mast and sail were erected and adjusted in the same way as the first, Donald cut two narrow strips of blue tissue paper, four and a half inches long, for pennants. (Figure 7.)

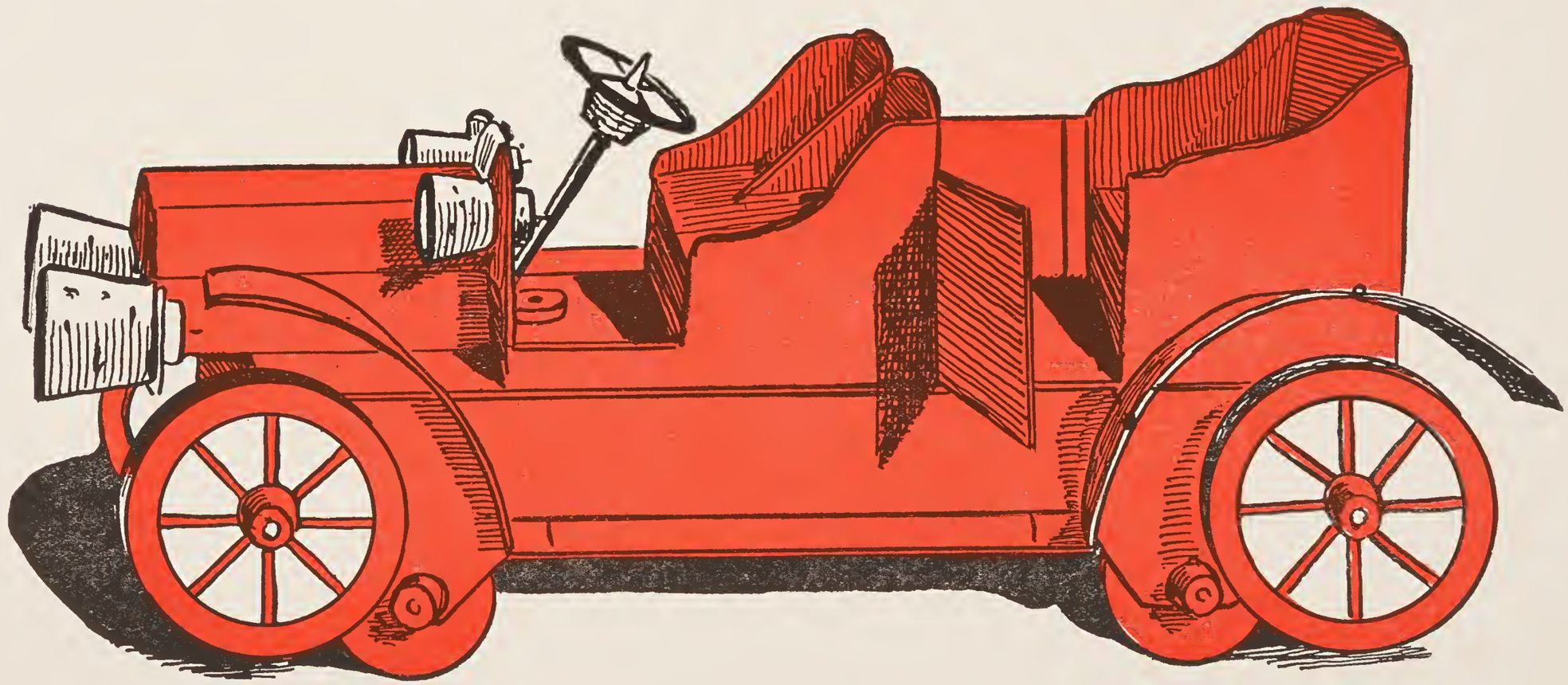
"She is done now," said Donald.

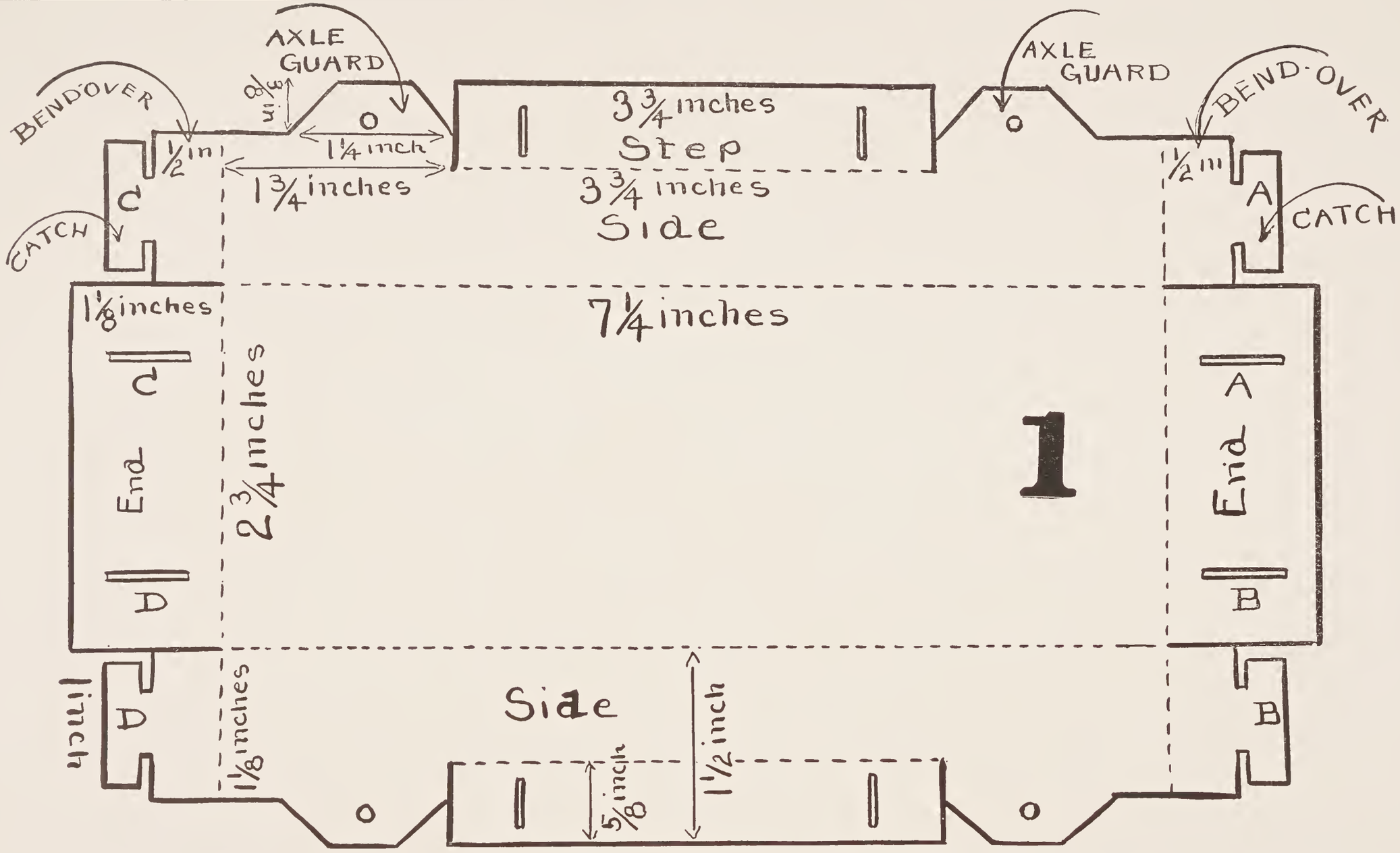
Making an Automobile

By Adelia Belle Beard

One of the Authors of Things Worth Doing

"DONALD," said Polly, "don't you think we could make a cunning little automobile if we tried ever so hard?"
"Y-e-s, we might if we could manage the wheels. They must be heavy and turn easily. It won't be a real auto unless it can go whizzing."





"Spools, spools!" she cried joyfully. "They will go as fast as lightning. See?" and jumping up she seized her workbasket, turned it upside down, found an empty spool, then dropped on her knees and sent the spool rolling across the hardwood floor.

"Spools are all right," said Donald. "Now, can we make our motor car?"

"Well, here is the bristleboard, but I should think it would be best to make a paper pattern first, then we can alter it as much as we like. Donald, do you remember just how an automobile looks?" Polly inquired, with a giggle, for

Donald's hobby was to know all about automobiles, and he was sure he could drive one as well as an experienced chauffeur if he had the opportunity.

Donald disdained a reply. "Where is the brown wrapping paper for the patterns? Oh, here it is," he said. "Now we will begin. Get the very largest spools you can find, Polly; two will be enough, but they must be the same size. Yes, these will do."

The spools Polly selected were two inches high, an inch and a quarter across the ends and had quite slender shafts.

"But, after all," objected Polly, "the spools don't look like auto wheels."

"That doesn't matter; we will put the spools under the car and make show wheels for the outside. No one will notice, when we speed the car, that her outside wheels are not turning, They'll appear to be."

"Then what shall we use for show wheels?"

"Pill boxes will do. Look them up, Polly, while I make the auto frame to hold the spools. And, Polly," he called, as she was leaving the room, "bring up some of those round, slender, little sticks I saw in the kitchen, will you?

"I guess you mean skewers. Jane uses them to pin meat together with. She got them from the butcher boy."

"Whatever they are, I want them for axles."

While Polly was gone Donald planned his auto frame, making it first of the wrapping paper, and without very accurate measurements. When she came back with the pill boxes and skewers, Donald slipped each of his two spools onto a skewer, fitted the skewer under the frame, rolled the frame on the table, and found his scheme would work. Then he took his pattern apart and spread it out in front of him.

"Queer looking thing, isn't it?" remarked Polly. "Shall I draw it on the bristolboard and make it more exact?"

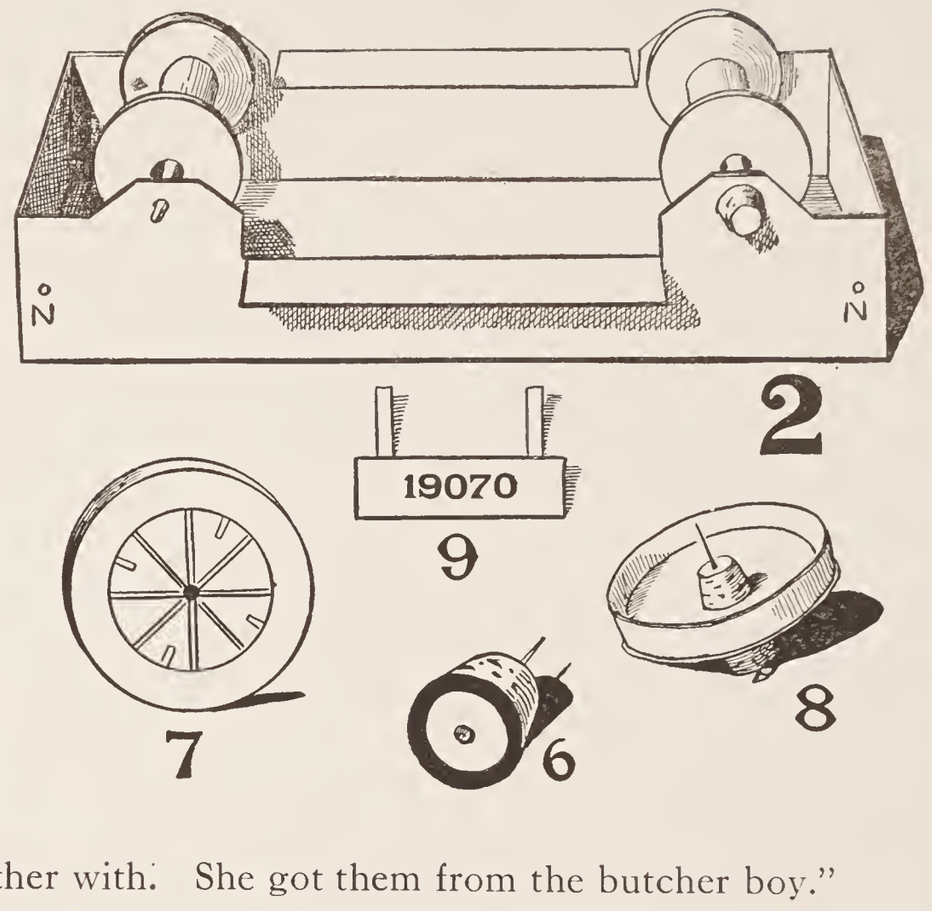
"Do," said Donald, "and be sure you get both sides precisely alike and both ends precisely alike, else it won't balance."

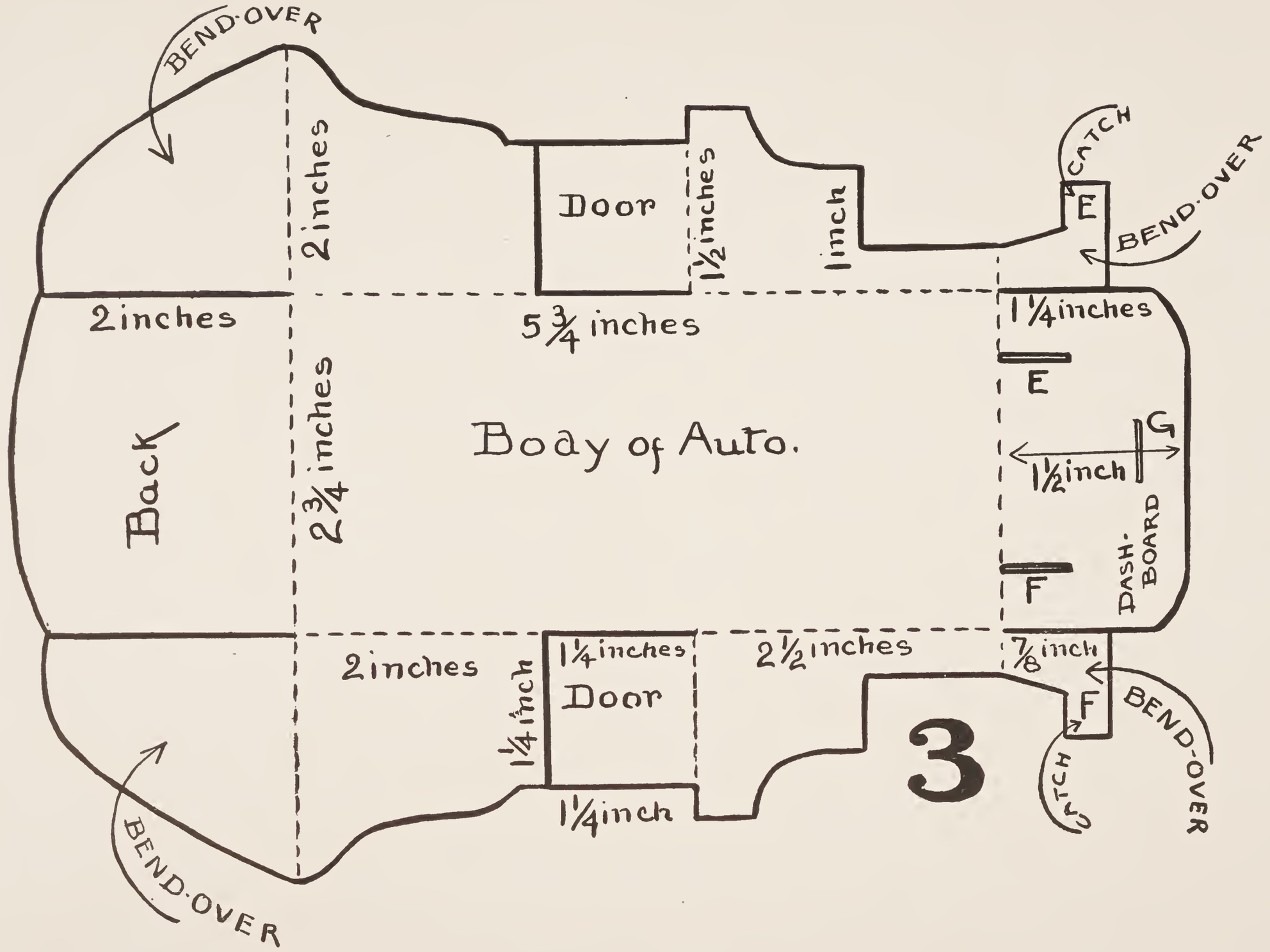
Polly nodded. "I'll begin with the oblong in the middle; that's the floor, I suppose, then draw the sides and ends to fit." So she fell to work while Donald perfected his pattern for the body of the car.

The center oblong Polly made seven and one-quarter inches long and two and three-quarters inches wide. (Fig. 1.)

"Be sure you make the sides and ends at right angles to one another," cautioned Donald.

"Yes, dear," said Polly, and she proceeded to draw the sides, making long oblongs one and one-half inches wide on either side of the large oblong, and for the ends she drew oblongs one and one-eighth inches wide across the entire width of the three long oblongs. "That simplifies things," she explained, as she extended the side lines of the large oblong




BEND·OVER
2 inches
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1½ inches
1 inch
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E
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1¼ inches
E
Body of Auto.
Back
2¾ inches
G
1½ inch
DASH·BOARD
F
2 inches
1¼ inch
1¼ inches
Door
2½ inches
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F
3
CATCH
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BEND·OVER

across the end oblongs. "Now I can cut it down where it needs cutting without losing the large proportions."

Five-eighths of an inch from the outer edge of each of the sides she drew a horizontal line for the steps. (Figure 1.) This line is three and three-quarters inches long. It begins just one and three-quarters inches from one end of the side and ends one and three-quarters inches from the other end. Then Polly drew the short vertical lines from the edge to meet the ends of the horizontal line, which gave her the end of the steps. On either side of each step she drew an axle guard three-eighths of an inch high, with a base half an inch wide and top an inch and a quarter wide. "Now I will make the bend-over and the catch," she said.

"That is a good name for it," said Donald. "Half an inch will be wide enough for the 'bend-over,' and make the catch one-quarter of an inch wide after you have allowed a little space between it and the bend-over."

"How much space?" inquired Polly.

"One-sixteenth of an inch will be wide enough, and don't make the catch quite as long as the bend-over. Cut a little off at each end. (Figure 1.) Be careful about the slits in the ends of the frame, Polly. They must be just half an inch from each edge, because the bend-over is half an inch wide, and since you have made the necks of the catches half an inch wide the slits must be a little longer."

"What are the slits on the steps for?"

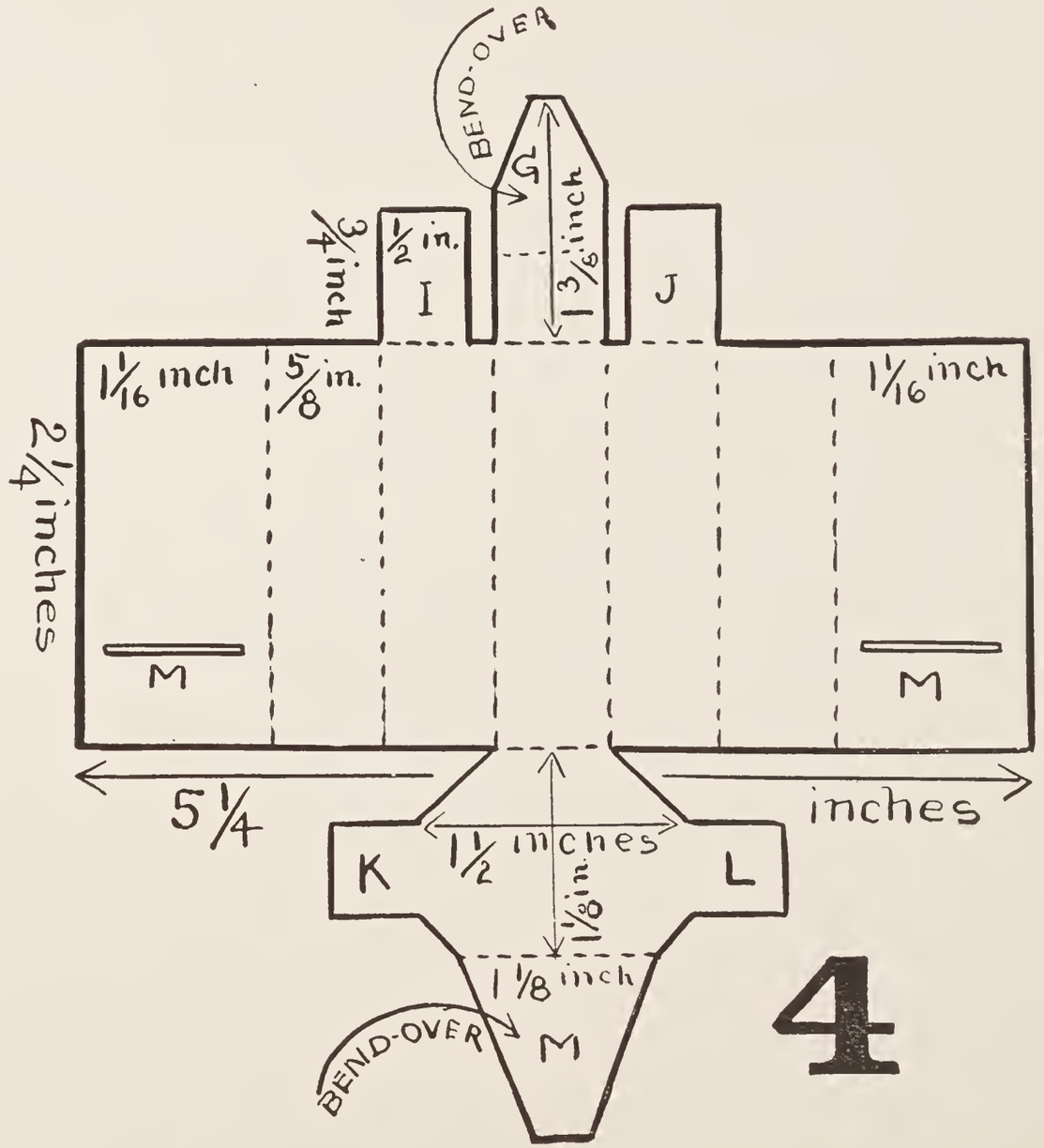
"They are to hold the mud guards. Make them about three-eighths of an inch long and put a slit half an inch from end of each step."

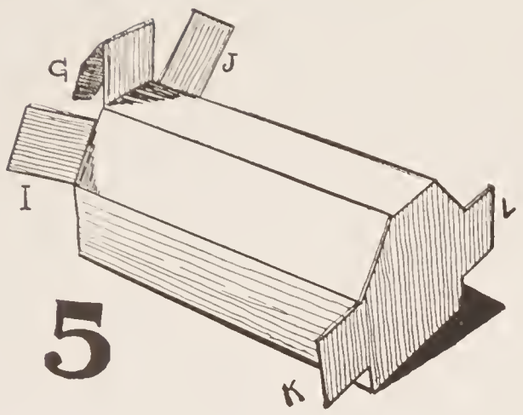
"That's explicit," commented Polly. "Shall I cut the frame out now?"

"Better first go over the lines you are to cut and make them quite heavy; then dot the lines to be bent, so that you won't spoil it by cutting along the wrong lines."

"Good advice; I'll do that."

"When cut out the auto frame looked like Figure 1.





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"I shall use my small scissors to cut the slits, Donald," Polly said. "The knife is so apt to slip."

Before bending the frame into shape Polly scored the dotted lines by drawing the blade of her knife lightly along their entire length, using a rule to keep the knife on the line. When the sides, ends and bend-overs were bent down Polly folded the ends of each catch inward, then lapped the bend-overs outside the ends, inserted each catch in its own particular slit, opened out the catches, and the ends and sides were held firmly and evenly in place. The catch A was put through the slit A, catch B through slit B, C through C and D through D. (Figure 1.) Then Polly bent the steps up to stand out at right angles from the sides. "I am ready for the spools," she announced.

14

"You will have to sharpen the blunt ends of these skewers, then," said Donald, "and cut them off if they are too long. Three and one-half inches will be just about the right length."

When she had cut her axles the proper length and sharpened the ends, Polly punctured a very small hole in each axle guard, as shown in Figure 1. Then, from the inside, she pushed one end of an axle through the hole in one axle guard, slipped a spool on the axle and forced the other end of the axle through the hole in the opposite axle guard. The auto frame upside down (Figure 2) shows how this is done.

"Now for the hub to keep the axle in place," she reflected. "I know," and with a spring she was up and off to rummage in her treasure box, coming back triumphantly with several small corks.

"See, Donald," she said, screwing the point of the axle into the large end of a cork. "It holds splendidly, and the spools cannot possibly drop off."

15

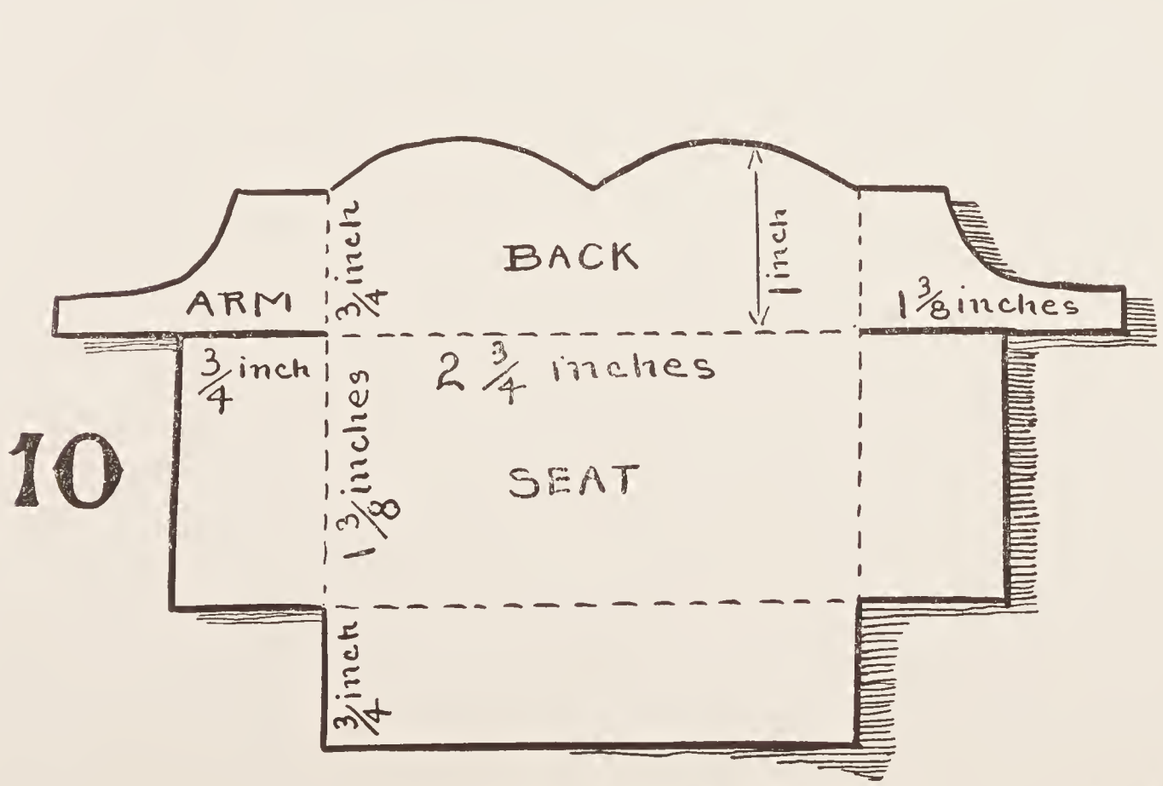
"First-rate idea, Polly; I hadn't thought of the hubs. This is the body of the car," he continued, showing his paper pattern. I'll draw it on the bristle-board if you will make wheels of the pill boxes."

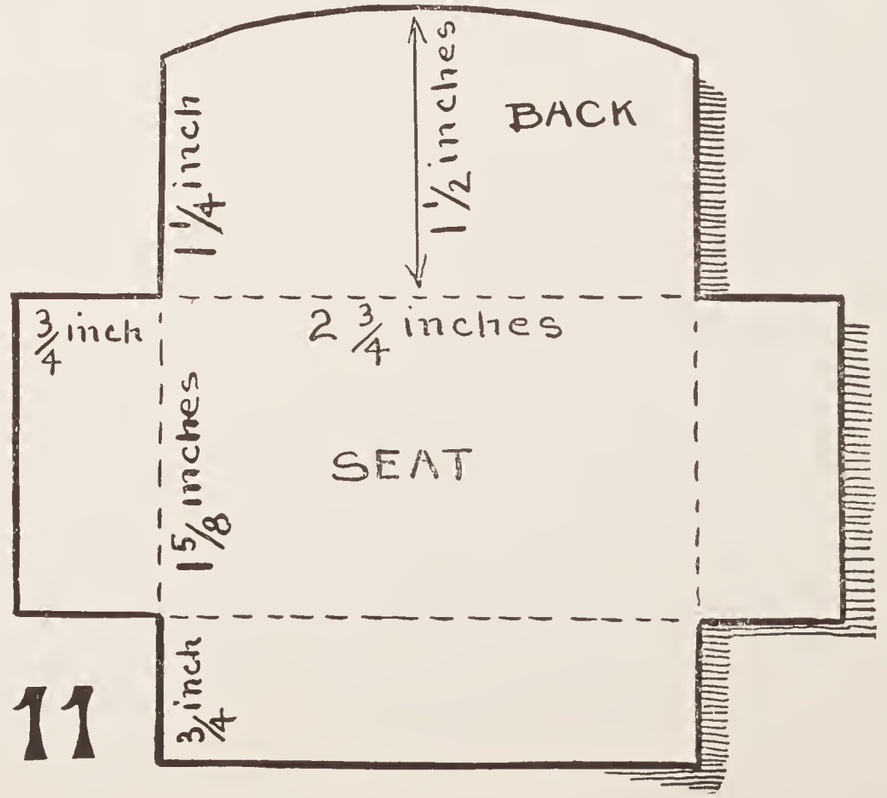
Figure 3 shows how Donald made the body of the automobile. The oblong in the center is the floor. It is two and three-quarters inches wide, just the width of the auto frame, and five and three-quarters inches long. The back is two inches high at the side edges and curves up one-quarter of an inch higher in the middle. The bend-overs at the back measure two inches at each edge, and curve, as in Figure 3. The length of the side from the dotted line of the bend-over to the door is two inches. The door is square, measuring one and one-quarter inches each way. The length of the side

between the dashboard and the door is two and one-half inches. Next to the door it is one and one-half inches high, and at the lower corner, where the curve ends, it is one inch high. The strip that meets the dashboard is three-eighths of an inch high. The bend-over, including the catch, is seven-eighths of an inch high and seven-eighths of an inch long, and the catches E and F are each three-eighths of an inch square.

The dashboard fits in between the two front bend-overs. It is one and one-half inches high in the middle and slopes to the sides, which are one and one-quarter inches high. The slits in the dashboard, E and F, are each one-half inch long and just one-half inch from the side edges. The slit G at the top is one-half inch long and three-eighths inch below the top edge. When Donald had cut out the auto body and scored the dotted lines, he bent up the back, front and sides, then lapped the back bend-overs across the outside of the back and fastened them in place by running a pin through from the outside, as shown in Figure 17. He found that the pin alone would not make it sufficiently secure; so, adopting Polly's idea, he pushed a cork on the pin, brought up snugly against the inside of the back, and it held like a bolt. The front bend-overs he lapped over the outside of the dashboard and pushed the catch E through the slit E and the catch F through the slit F.

"Oh, Donald, the little doors will open, won't they!" Polly exclaimed.

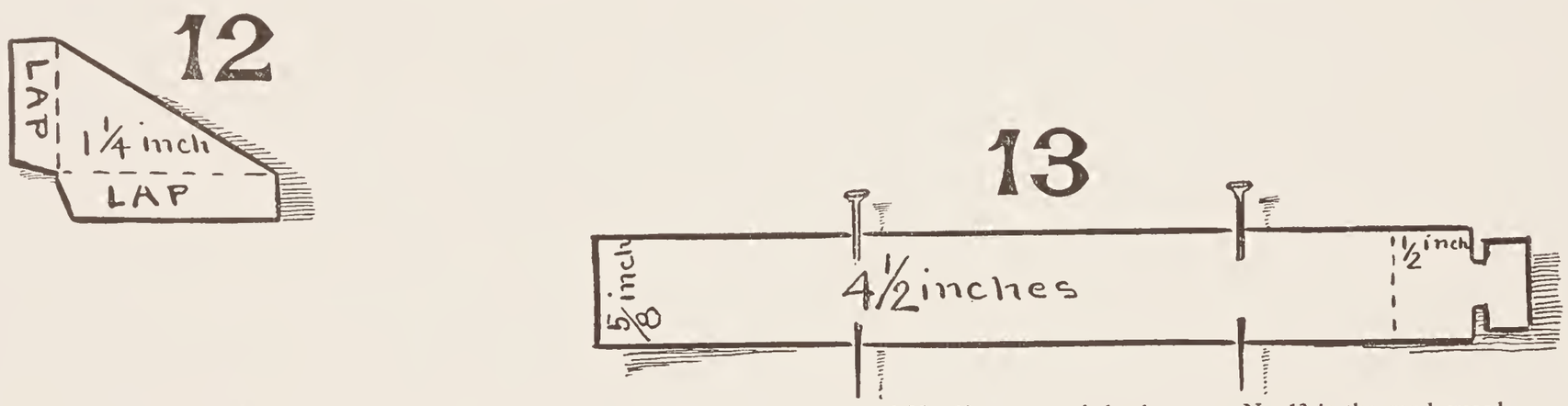




The seats are easily made. No. 10 is the front seat, No. 11 the back seat, and No. 12 an arm of the former. No. 13 is the mud guard

"Of course," said Donald, bending them outward along the dotted lines. "This is the hood," he went on. "The power box, you know," showing his pattern like Figure 4. "I will draw it on the bristleboard now."

First, Donald drew an oblong, five and one-quarter inches long and two and one-quarter inches wide. This he divided into seven parts, or panels, by drawing straight, vertical lines across the oblong. (Figure 4.) Each of the two end panels he made one and one-sixteenth inches wide and each of the other panels five-eighths of an inch wide. He extended the middle panel up one and three-eighths inches above the oblong, and across the extension, half an inch above the top line of the oblong he drew a dotted line to denote that beyond that was a bend-over. Then he cut off the corners of the bend-over. (H, Figure 4.) He made extensions three-quarters of an inch high above the two panels next to the middle panel, then he cut off the inner part of these extensions, making each half an inch wide. (I and J, Figure 4.)



The seats are easily made. No. 10 is the front seat, No. 11 the back seat, and No. 12 an arm of the former. No. 13 is the mud guard

Directly through the center of the middle panel Donald drew a straight, vertical line, bringing it down several inches below the bottom of the oblong. He did this in order that he might measure on either side and so get the end of the hood exactly in the middle and evenly balanced. He called this center line his plumb line.

Three-eighths of an inch below the bottom line of the oblong, and three-quarters of an inch to the left of the plumb line, Donald drew a horizontal line just half an inch long; then he drew a corresponding line at exactly the same distance to the right of the plumb line. These lines he connected with the bottom corners of the middle panel with slanting lines. (Figure 4.) Half an inch below the two short horizontal lines he drew parallel lines of the same length and connected their outer ends with the outer ends of the upper lines by vertical lines. This made two square extensions. (K and L, Figure 4.) One-quarter of an inch below the lower lines of the extensions K and L he drew another horizontal line one and one-eighth inches long, half on one side of the plumb line, half on the other side, and then he connected this horizontal line with the inner ends of the bottom lines of the extensions K and L by slanting lines. This formed the octagon-shaped front face of the hood. Below the octagon he drew a bend-over one inch high and running almost to a point at

the bottom and half an inch above the bottom edge of each end panel he made a slit three-quarters of an inch long. (MM, Figure 4.)

When Donald bent the hood into shape it looked like Figure 5. The end panels from the bottom of the hood, and lapping completely over one another, make it double, and the point of the bend-over (M, Figure 4) slipped through the two slits M and M holds the hood in shape.

"But I don't see how you are going to fasten it on," said Polly.

"Wait until I make the lamps," Donald answered, "and I will show you. Are there any more corks, Polly?"

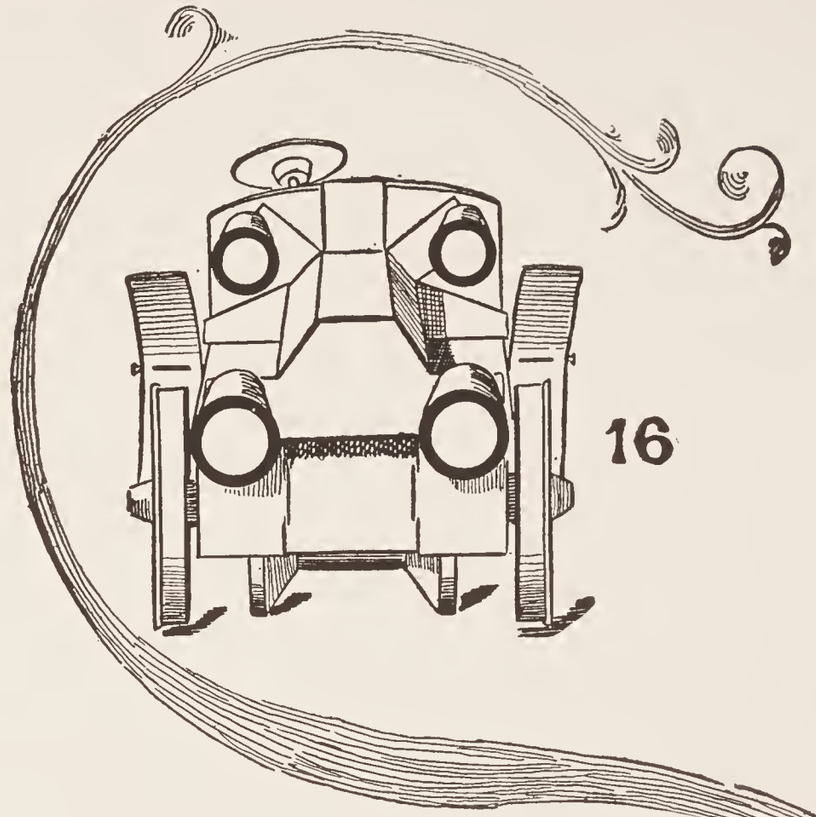
"Yes; how many do you want?"

"Four for the lamps, but bring all you have."

Donald selected two pretty good sized corks for the lower lamps and two smaller ones for the upper lamps. Both sizes were rather longer than he wanted, so he cut a slice off the small end of each cork. This left the largest corks three-quarters of an inch long and the smallest half an inch long.

"Now, Polly," he said, "we will cut some rounds of silver paper to fit the tops of these corks and paste them on to represent glass, then paint black circles around them for the rims to hold the glass. That will make them shine." (Figure 6.)

In a trice the lamps were finished and Donald fastened the largest ones on the extensions K and L at the front of the hood by running a large pin through the middle of each lamp, then through the extension, securing it at the back with a thick slice of cork. This done he proceeded to fasten the hood to the dashboard; first by



A front view and a rear view of the children's automobile

running the bend-over H through the slit H from the inside of the dashboard, then by pinning the small lamps on the extensions I and J, running the pin through the dashboard also, and making fast with slices of cork. The exact position of the lamps is shown in the front view of the automobile. (Figure 16.)

"Now fasten the whole thing together," urged Polly, and Donald adjusted the body of the car to its frame. He allowed the back of the body to project over the back of the frame half an inch, which gave one inch and three-quarters space in front of the hood to rest on. The hood extended about half an inch beyond the front of the frame.

"The pins and corks hold so well I'll use them for this," Donald announced, as he pinned the floor of the auto body to the top of the frame. He put one pin just back of the dashboard and another close to the back of the auto body. This time he used two slices of cork for each pin, one on top of the floor, the other underneath the frame.

The two back mud guards Donald made like Figure 13, which is a strip of bristleboard five and one-quarter inches long and five-eighths of an inch wide. The dotted line at the end, showing where it is to be bent, is three-quarters of an inch from the end and just half an inch from the slots that separate the catch from the guard. From the dotted line to the other end the guard is four and one-half inches long.

The two front mud guards he made exactly like the back ones, except that between the dotted line and the dotted line and the opposite end the distance was but two and three-quarters inches. He curved all four of the guards by drawing them lightly over the blade of his knife; then he bent them at the dotted lines, turned in the ends of each catch and inserted each catch in its slit in the auto step. The two back guards he put at the back ends of the steps, the two front guards at the front ends of the steps. Taking two pins, he inserted them in one of the back mud guards, as shown in Figure 13; then he pushed the pins into the side of the car, the lower one into the frame just below the door and the other into the auto body about one-quarter of an inch from the back. The other back guard he secured in the same way, but one pin only was needed for each of the front guards. This was run in three-quarters of an inch from the bend of the guard and forced into the frame just in front of the dashboard.

"Are the wheels ready?" asked Donald.

"Here they are," and Polly pushed across the table four little wheels like Figure 7. "I didn't use the box covers because there was writing on them, but I tore away the upper part of the box and the lower part was exactly like the lid. I drew a circle on the bottom of each box to mark off the tire and then drew the spokes and little air valves. See them?"

"We will give the tires a light wash of black paint to make them rubber color and paint the spokes black," said Donald.

When they were finished Donald used three small corks for fastening each wheel in place. One for the hub, one inside the wheel, to steady it against the auto frame (Figure 8), and one on the inside of the auto frame. The front wheels he pinned at the extreme front of the auto frame, half way up from the bottom edge of the frame, and the back wheels at the extreme back of the frame, the same distance above the bottom edge. (NN, Figure 2.)

"You see," said Donald, "these wheels must not touch the ground, else they will interfere with the speed of the car."

"Here are the seats," said Polly. "I worked them out while you were busy with the other parts."

Figures 10, 11 and 12 are the patterns of the seats. Figure 10 is the front seat and Figure 12 the arm that divides it into two. The seat proper is an oblong two inches and three-quarters long by one inch and three-eighths wide. The ends and front that bend down and form the supports are each three-quarters of an inch high. The back is one inch high at the middle of each curve and three-quarters of an inch high when it bends to form the arms. The arms, which are cut to fit the sides of the auto, are one inch and three-eighths long. The middle arm (Figure 12) is one and one-quarter inches long at the bottom, three-quarters of an inch high at the back and the laps are each one-quarter of an inch wide.

Polly used paste to fasten the arm to the middle of the seat, putting the paste on the laps, then she fitted the seat in the car, pasting the sides of the seat to the sides of the car.

The back seat has no arms. It is the same length as the front seat, but one-quarter of an inch wider. The supports are the same height. The back at the middle is one and one-half inches high, while at the side edges it is one and one-quarter inches high. When the back seat was pasted to the back and sides of the car, Polly decided that she would make little cushions and cover them with tan-colored tissue paper, to look like leather.

"I have made the steering wheel," said Donald, and he held it up. (Figure 14.) Figure 15 shows how it is cut from bristleboard and then marked off into a rim and four spokes. He used a wooden toothpick for the column and a small cork to keep the wheel in place. First he forced the small cork onto the toothpick, pushing it down not quite half an inch, then he inserted the point of the stick into the small hole he had previously punctured in the center of the wheel and pushed the wheel down to rest on the cork. (Figure 14.)

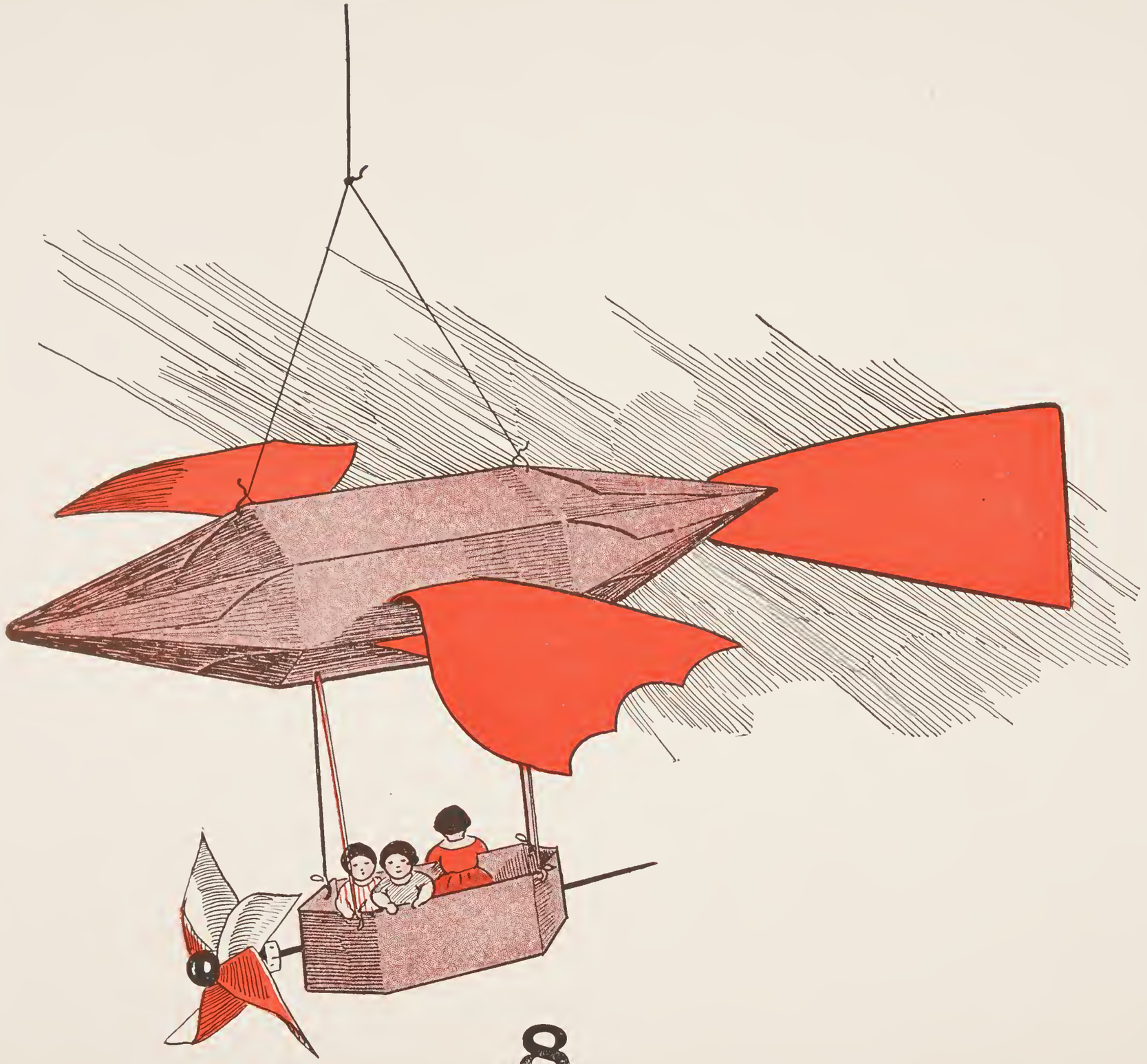
With a large hatpin he pierced a hole slantingly at the base of the dashboard, half an inch from the right side, all the way through the frame of the auto; then he forced the lower end of the steering column into the hole and it retained the proper slanting position.

"I didn't forget the number," said Polly, holding up a little oblong card, to which she had attached narrow strips of yellow paper for straps. On the card was printed the number of the Kraft Shop automobile. (Figure 9.) With a drop of paste on the end of each strap Polly hung the number to the back of the car. (Figure 17.)

The finished motor car is shown in Figure 18.

"Now we will test her speed," said Donald, as he knelt on the floor and with a sure, strong push sent the auto spinning the whole length of the room.

"My, but it does go!" said Polly.



8

Making the Bird Airship

By Adelia Belle Beard

One of the Authors of Things Worth Doing

"HOW are we going to make an airship when we can't fill the bag with gas?" said Donald. "Why, make it of stiff paper and it will stand out without gas," Polly answered. "Yes, but I don't see what is to hold it up?" Donald objected. "We will make the airship first and then find something to hold it up," Polly replied, cheerfully.

"That's a girl's way of doing things," laughed Donald.

"Well, it's a good way," retorted Polly.

Donald did not entirely agree with her, but Polly's way seemed the only way in this case. "Of course we will make the balloon cigar shaped, like a dirigible, and have a propeller," he said.

"Yes, and let us make wings, too; they will help keep it in the air," Polly added.

"And a tail for a rudder," said Donald.

"Why, it will look just like a bird!" Polly exclaimed. "And we can call it the 'bird airship.' That sounds nice, doesn't it, Donald?"

"All right," said Donald; "now I'll make the balloon."

"Oh, Donald, please let me do that. You always take the hardest parts and I know I can do some of them," protested Polly. "Besides, I have thought of a way to make it."

"Well, I don't care if you make the balloon," said Donald. "This is your scheme, anyway. I'll do the other things, but use this stiff manila paper, Polly; it is good and strong."

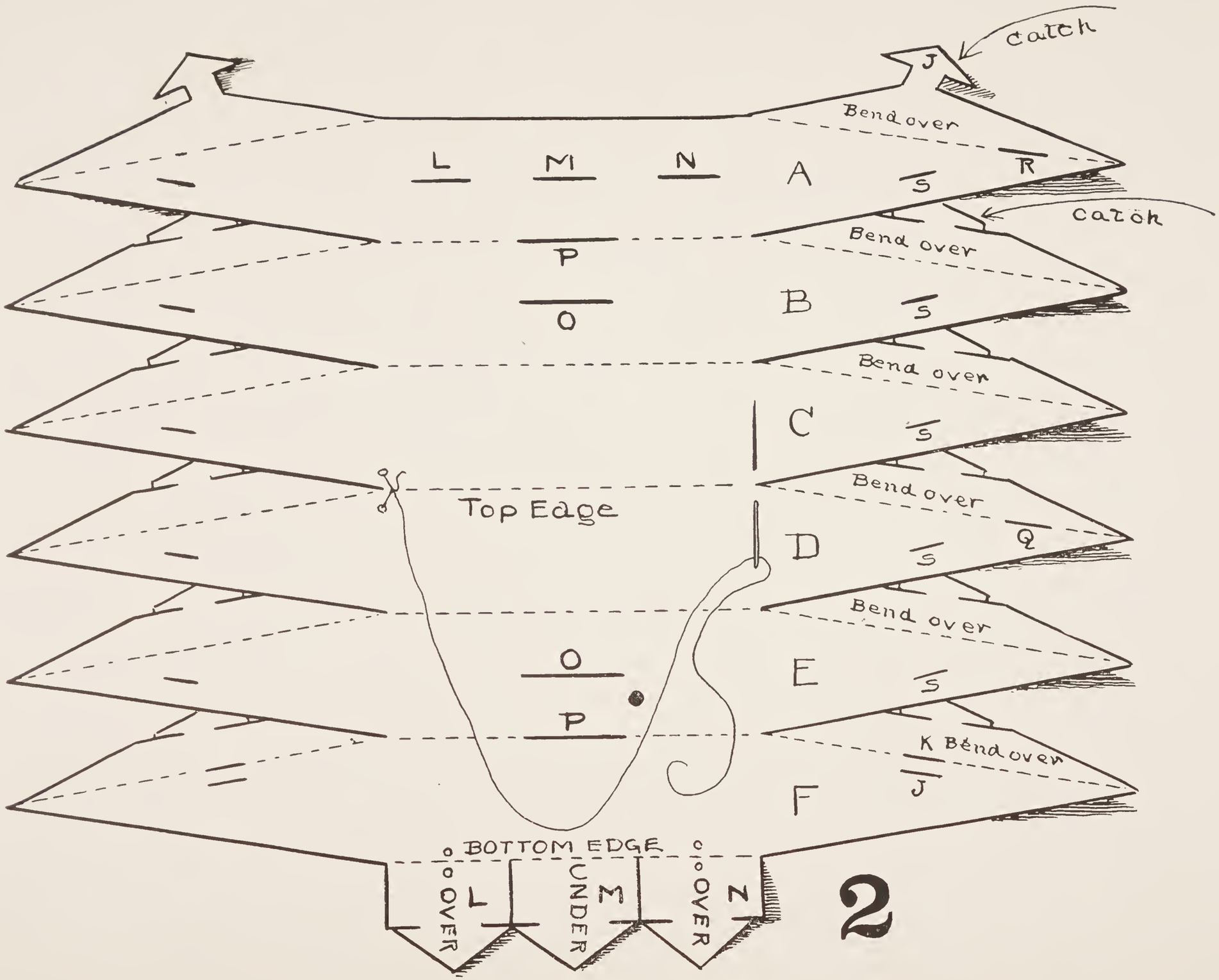
Polly was soon at work bending and clipping and shaping a pattern that later she would correct and reduce to exact measurements. Donald watched her while he waited to learn what size to make the wings, tail and little passenger car.

"I am making the balloon in panels," Polly informed him. "It is easier than trying to keep it round, and I shall cut each end into points with a bend-over on each point to fasten them together."

"Going to glue it?"

"Why, no. I thought I would button it together with catches and slits. It is hard to glue a thing of this kind, and one has to hold each part so long for the glue to harden," Polly answered.

Figure 1 shows how Polly drew the pattern for her balloon after making it out. She was very careful in her meas-


Catch
J
Bend over
L
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A
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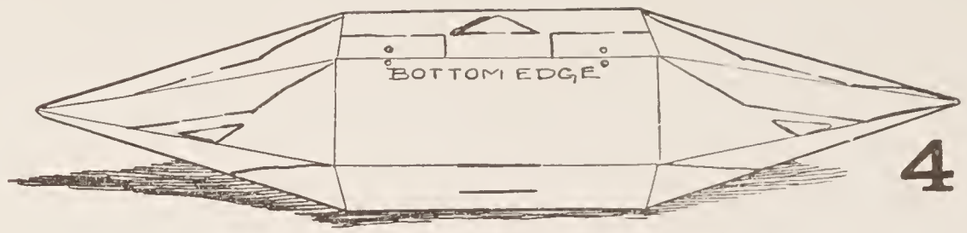
2

urements, using a rule and making the lines for the panels exactly one inch apart. "The sides won't fit if they are not even," she said to herself.

"That looks simple enough," commented Donald.

When Polly cut the balloon out along the heavy lines it was like Figure 2.



When the balloon was put together it looked like this

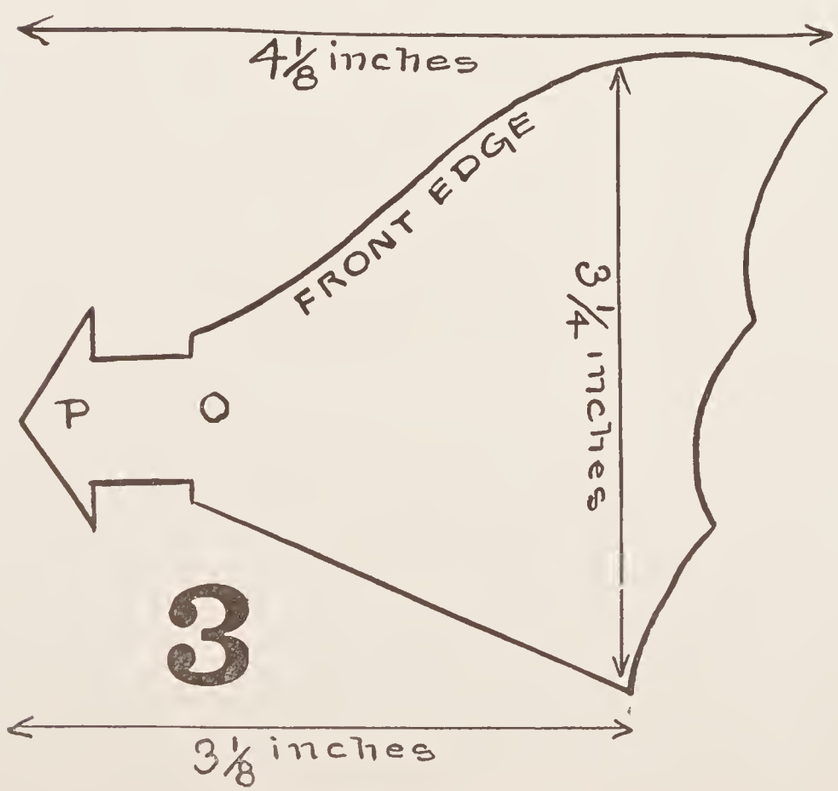
By this time Donald, who had been experimenting with Polly's first pattern, had designed the wings (Figure 3), and the tail (Figure 5). He directed Polly to cut slits for the wings in the position shown in PO, OP, Figure 2. The slits P are exactly in the middle of the edge between the first and second panels at the top and the first and second panels at the bottom, and the slits O are in the middle of each second panel, top and bottom. Each slit is three-quarters of an inch long.

"Now make slits for the tail in the top edges of the top point and the fourth from the top point," said Donald. "Make each slit five-eighths of an inch from the tip."

"How long a slit?" said Polly.

"Three-eighths of an inch," returned Donald.

So Polly made the slits R and Q, Figure 2, and then bent the balloon along the dotted lines. Donald made the wings (Figure 3) four and one-eighth inches long from tip of catch to tip of wing. The neck of the catch is one-half of an inch long and five-eighths of an inch wide, and the catch from tip of point to neck is three-eighths of an inch deep. Just above the neck of the catch the wing is seven-eighths of an inch wide and at its broadest part it is three and one-quarter inches wide.



Donald cut the wings like this

Donald bent in the points of the catch of one wing and pushed the catch in through the slit O in the balloon and out through the slit P, then he opened out the points of the catch.

"That will hold it steady," he said, and fastened the other wing on in the same way.

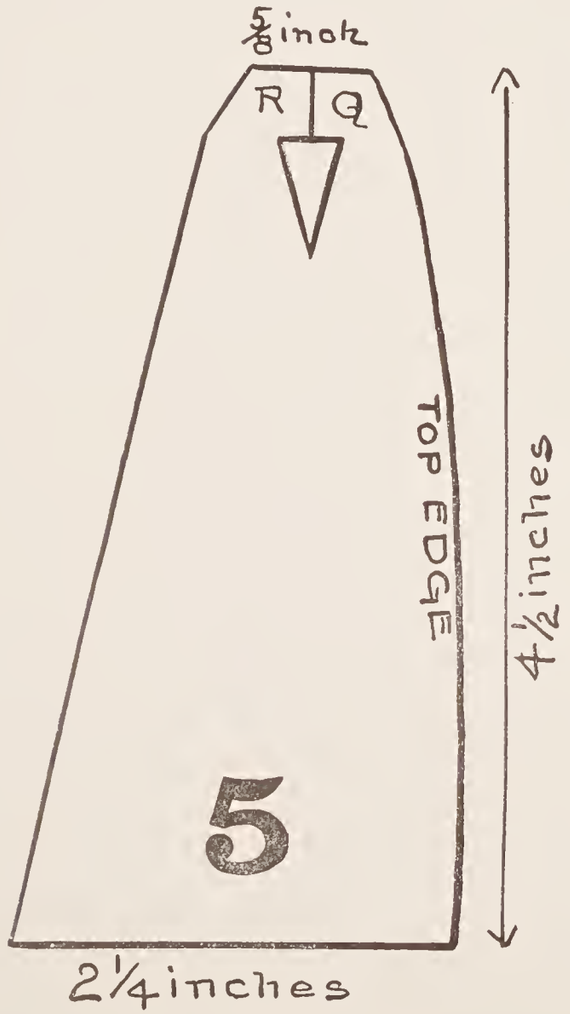
"Do you want to fasten the tail on now?" asked Polly.

"No. Put the balloon together first," said Donald.

Then Polly began to shape her balloon by slipping the catches of the bend-overs at the bottom L, M, N through the slits L, M, N. She lapped L and N *over* the panel and M *under* the panel. This brought the catches of L and N on the inside, and the catch of M on the outside.

Then she lapped the bend-over of the point B over the edge of the point A and inserted the catch of the bend-over in the slit in the point A. The catch of the bend-over of the point C she put through the slit in the point B, and in the same way fastened D to C, E to D and F to E. This brought all the points at one end of the balloon together, except F and A, and these she secured by putting the catch J of the point A in through the slit J and out through the slit K in the point F, which brought the catch on the outside. The other end of the balloon she put together in the same way, and it looked like Figure 4.

"This is the tail," Donald said, holding up a piece of paper cut like Figure 5. The tail is four and one-half inches long, two and one-quarter inches wide at the end and five-eighths of an inch wide where it joins the body. Donald cut a slit half an inch long in the middle of the narrow end and then cut out a small, wedge-shaped piece at the end of the slit. The wedge is five-eighths of an inch long and a trifle over one-quarter of an inch at the base.



The tail acts as a rudder

"What is that pointed hole for," said Polly.

"The end of the balloon fits in that when these two square catches (Q, R, Figure 5) are put through the slits you made for the tail," Donald answered. (Q, R, Figure 2.) Polly looked for the slits and found that one was on the top edge and one on the bottom edge of the back end of the balloon.

"Now we will hitch it on," said Donald, taking the balloon from Polly and adjusting the tail. He opened the slit between the catches, pushed the catch Q down through the top slit Q, and the catch R up through the bottom slit R, and the tail could not slide out of place. "The wings must stand out at the sides," he added, bending each wing down where it joined the balloon.

"Is this the car?" Polly inquired, taking up the little box. (Figure 6.)

"Yes," said Donald, "but I haven't put the propeller on yet."

The car Donald made is pointed at each end. It is three inches long from point to point, one inch wide and one inch high. Each side of the car is two inches long and the ends are double. Figure 7 is the pattern of the car. The entire length of one side of Figure 7 is five inches, while the entire length of the other side is but four and three-quarters inches. The difference is at the ends. The end divisions on the left of Figure 7 are three-quarters of an inch from top to bottom, while the end divisions on the right are only five-eighths of an inch from top to bottom. The other divisions of the two ends are exactly alike, each three-quarters of an inch from top to bottom. The slits V, W, T, U, are one-eighth of an inch from the inner edge and are three-eighths of an inch long. V and U are one-eighth of an inch from the end edges and the slits W and T are one-quarter of an inch from V and U.

Donald made a catch at either end of the left side of Figure 7 (Y, X). The necks of these catches are one-quarter of an inch long. Then he bent up the points V, W, U, T, along the dotted lines, which made the floor of the car pointed at each end. He bent the sides up and the ends in, according to the dotted lines. The points V, W, U, T, he pushed through the corresponding slits from the inside of the car, V through V, W through W, U through U and T through T. Then he fitted the other end pieces on the outside, covering the points, and fastened the catches Y and X in the slits Y and X. This held the point securely between the double ends and made all snug and tight.

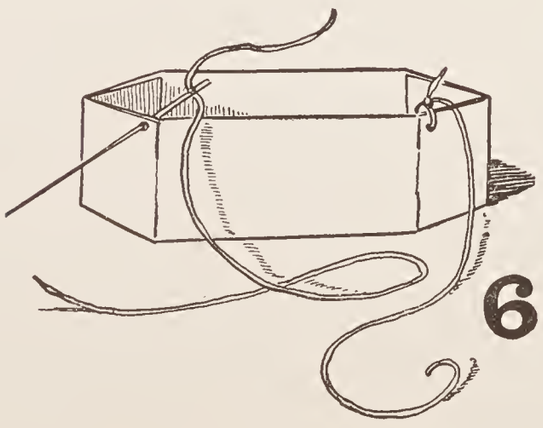
"I can put the ropes on now," said Polly, and threading a needle with soft cotton twine she pushed the needle through the double end of the car just beyond the side bend and near the top edge, as shown in Figure 6. She drew the string through and tied it at the end. Threading the needle again, she fastened another string to the other end of the car; then, with the needle still threaded, she took a stitch in the bottom edge of the balloon at the middle of one of the bend-overs. The place is indicated by the two dots on Figure 4. Bringing the needle down again, she ran it through the opposite side of the car, unthreaded it and tied the end of the string to the car.

This made a loop which passed from one side of the car through the bottom edge of the balloon to the other side of the car. The string used for the loop was three and one-half inches long. The other end of the car Polly attached to the balloon in the same way and the little passenger car hung suspended from the balloon by four ropes. (Figure 8.)

"I have the propeller ready now," said Donald.

"What a good idea to use a pinwheel for a propeller!" exclaimed Polly. "How will you fasten it on?"

"This way," said Donald, and he ran a hatpin through the pinwheel, pushed a small cork up on the pin, leaving one inch between the cork and the head of the pin so that the wheel would turn easily. (Figure 9.) Then he forced the pin in through the middle of the forward end of the car and out the middle of the back, allowing a space of one-quarter of an inch between the cork and the car. (Figure 8.)



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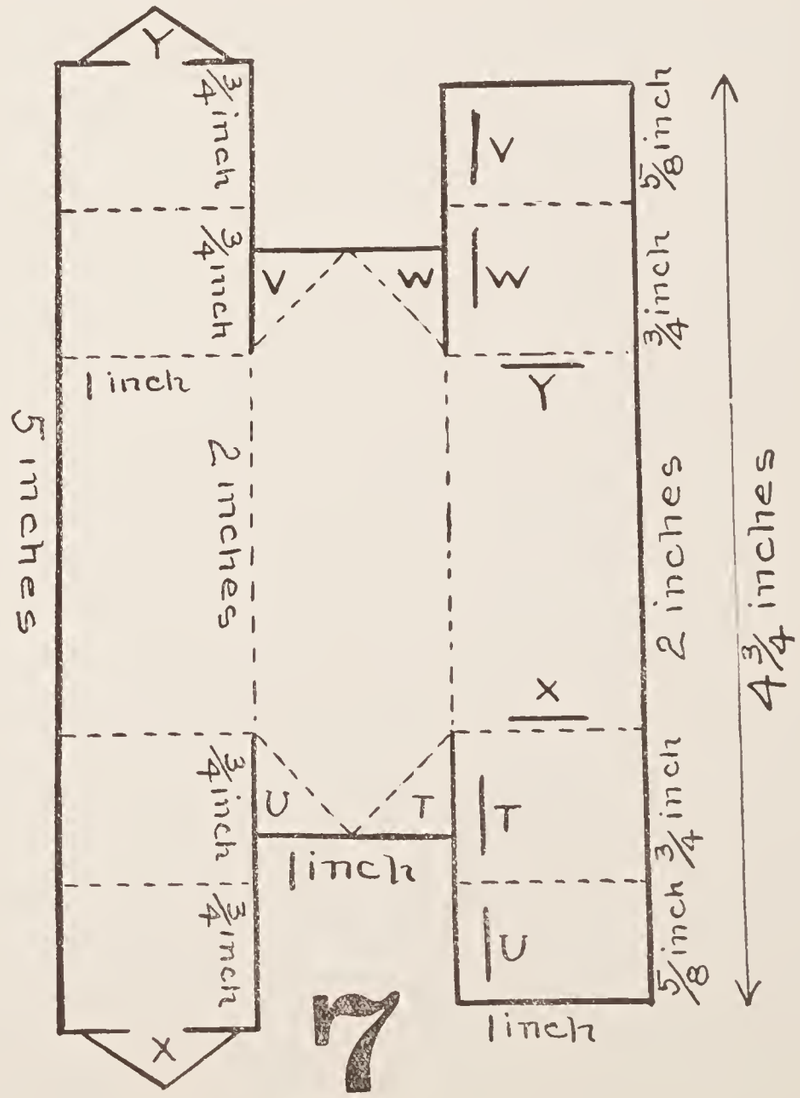
Polly put the ropes on the little car



This is the pattern of Donald's little car

"Why, Donald, you have put the propeller in front of the car!" cried Polly.

"That is all right," Donald assured her. "It won't spin around if we have it at the back; and, besides, Santos Dumont, who has made some of the finest airships in the world, put the propeller at the front of some of them. He says it draws the ship along instead of pushing it."

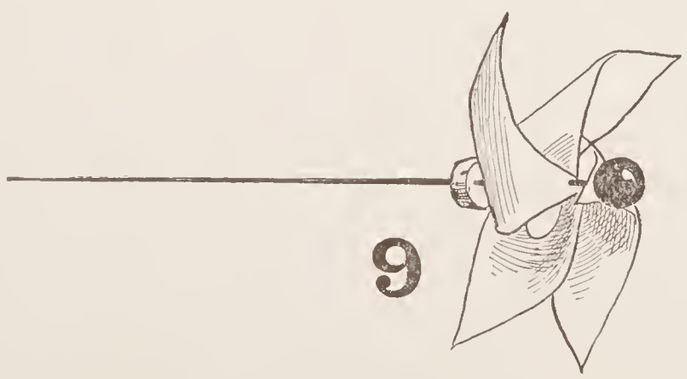
Donald made the pinwheel for his propeller of a two-inch square of paper. He folded the square diagonally first one way, then the other, and cut slits along the folds almost to the center, as I am sure you all know how to do. Then he took up the alternate points and, turning them over to the center, ran the pin through them and the center of the wheel in the way you have done scores of times.

"Now, Polly," said Donald, "how are you going to make the thing fly?"

"I will show you," said Polly, and she threaded a needle with a piece of strong black linen thread ten inches long. Then she took a stitch through the top edge of the balloon at the forward end, drew the thread through and tied the end fast. She took a stitch through the top edge of the balloon at the other end, where she tied the last end of the thread. This made a loop extending upward from the top of the balloon. (Figure 8.)

In Figure 2 you will see just where the needle was put through the edge of the balloon. At the middle of the loop Polly tied another piece of thread about two feet long, and at the end of the long thread she tied a short loop.

"Watch it now, Donald!" she cried, as, grasping the short loop tightly in one hand and holding it at arm's length, she began to swing the airship around in a circle. Slowly it went at first; then, gathering speed, it began to fly in earnest. The little propeller spun around busily and the ship seemed sailing by its own power. As the supporting thread was black, it was hardly visible, and the wings that were lifted and lowered by the movements of the ship appeared, like a bird's wings, to buoy it up.



The propeller is made of a pinwheel on a short hatpin

"Isn't it perfectly lovely?" Polly exclaimed. "See how I can make it dip and rise again, just like a real airship."

Yes, it is certainly good," he said; "and one of the best things about it is the way the tail acts as a rudder. Don't you see how it keeps the ship going always forward? Here—let me see if I can make it back." And, taking the thread from Polly's hand, he swung the ship in a straight line, first one way then the other, but at each end of the course the balloon turned and started over the route again, bow forward.

"It is all right, Polly," he declared. "Put some of your little dolls in the car for passengers and we will give them a ride."

Sand Toys

By Adelia Belle Beard

One of the Authors of Little Folks' Handy Book

"WHAT can we do with this beautiful sand, Donald?" asked Polly as she let the dry white sand of the beach sift through her fingers.

"Make a sand wheel," answered Donald with sudden inspiration. "And we can do it now."

Polly was more than willing, so they were soon hard at work in their out-of-door Kraft Shop on the back porch of their summer home.

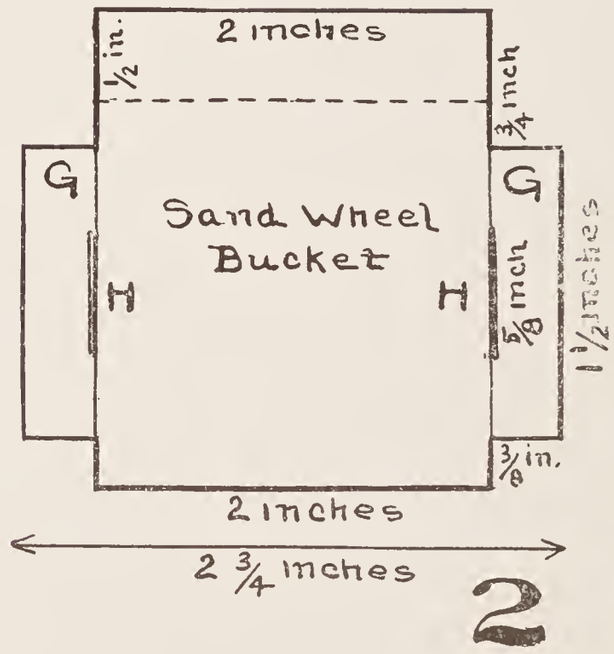
"First we must make the wheel and next a high reservoir to hold the sand," Donald announced.

"I will make the wheel if it doesn't have to be wood," said Polly.

"Bristolboard will do, and the wheel must be a good deal like a water wheel, you know, Polly.

"Yes, of course," and Polly placed a smooth piece of bristolboard on the table and took her school compass from the drawer, while Donald disappeared into the house in search of a flat-sided cocoa can which he had decided would answer for his reservoir.

Polly made her wheel in this way: First she drew a straight, horizontal line six inches long on the bristolboard (E B, Figure 1), then she put the point of her compass directly on the middle of the line and drew a circle that just touched each end of the line. This gave her a circle six inches in diameter. (Figure 1.) Keeping the point of her compass on the middle of the line, she drew another circle inside the first, making the second circle five and one-quarter inches in diameter and three-eighths of an inch from the outer circle. Inside the second circle, with the point of the compass still on the middle of the line, she drew a third circle two inches in diameter. This left just one and five-eighths inches between the two



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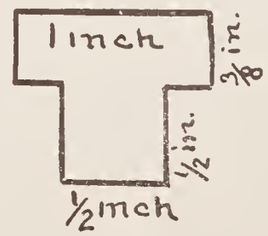

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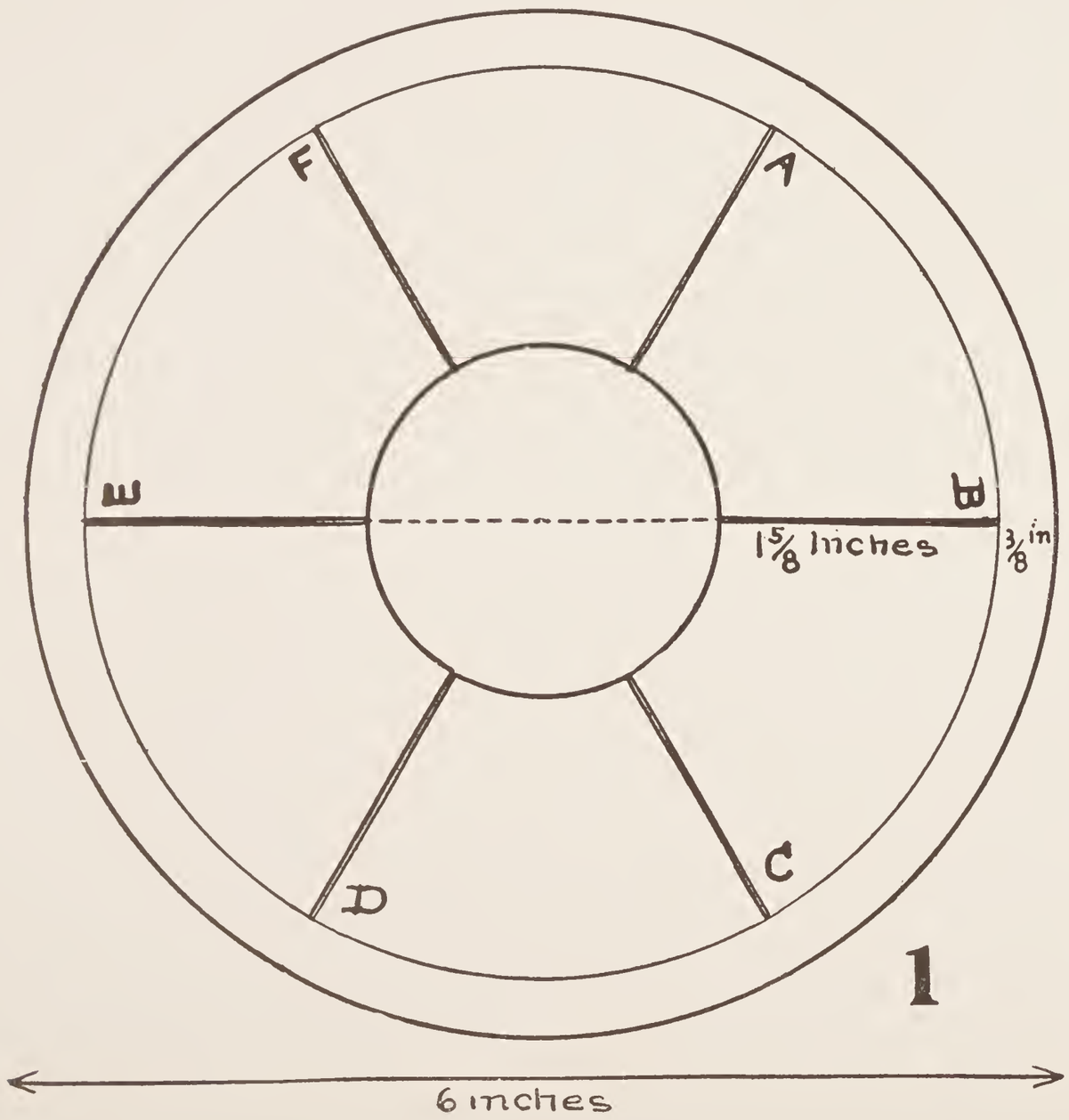
inner circles. Dividing the second circle into six equal parts, she proceeded to draw the lines F C, A D, and a little to the right of these, also by the side of the horizontal line, she drew parallel lines. "These," Polly explained, "are the slots to hold the steps of my wheel."

"Buckets, Polly, not steps," protested Donald.

"Well, buckets; I am going to have six buckets between the two wheels."



"There is only one wheel; the sides are called disks," again corrected Donald.

"Disks, then, and I will fasten the buckets on with bolts. You see, the outer edge of each bucket is to be turned up to hold the sand. I suppose that is why it is called a bucket," said Polly.

"You know what you are doing, go ahead," said Donald; and Polly went ahead. She made another disk exactly like Figure 1 and cut both out carefully. She used a sharp pocketknife for cutting the slots and a ruler to guide the knife along the lines. Then she made her buckets, six of them, like Figure 2. First she drew a square that measured exactly two inches on each edge. This was for the bottom of the bucket. On each side of the square she added extensions three-eighths of an inch wide and one and one-half inches long, placing them at equal distances from the top and bottom edges of the square. (G G, Figure 2.) At the top of the square she added an oblong one-half inch wide and extending all the way across. The dotted line in Figure 2 shows where this oblong is to be bent up to form the front of the bucket. Along each side line of the square, at equal distances from the ends of the extension, she made slots five-eighths of an inch long. (H H, Figure 2.) The bolts, two for each bucket, she made like Figure 3. The upper

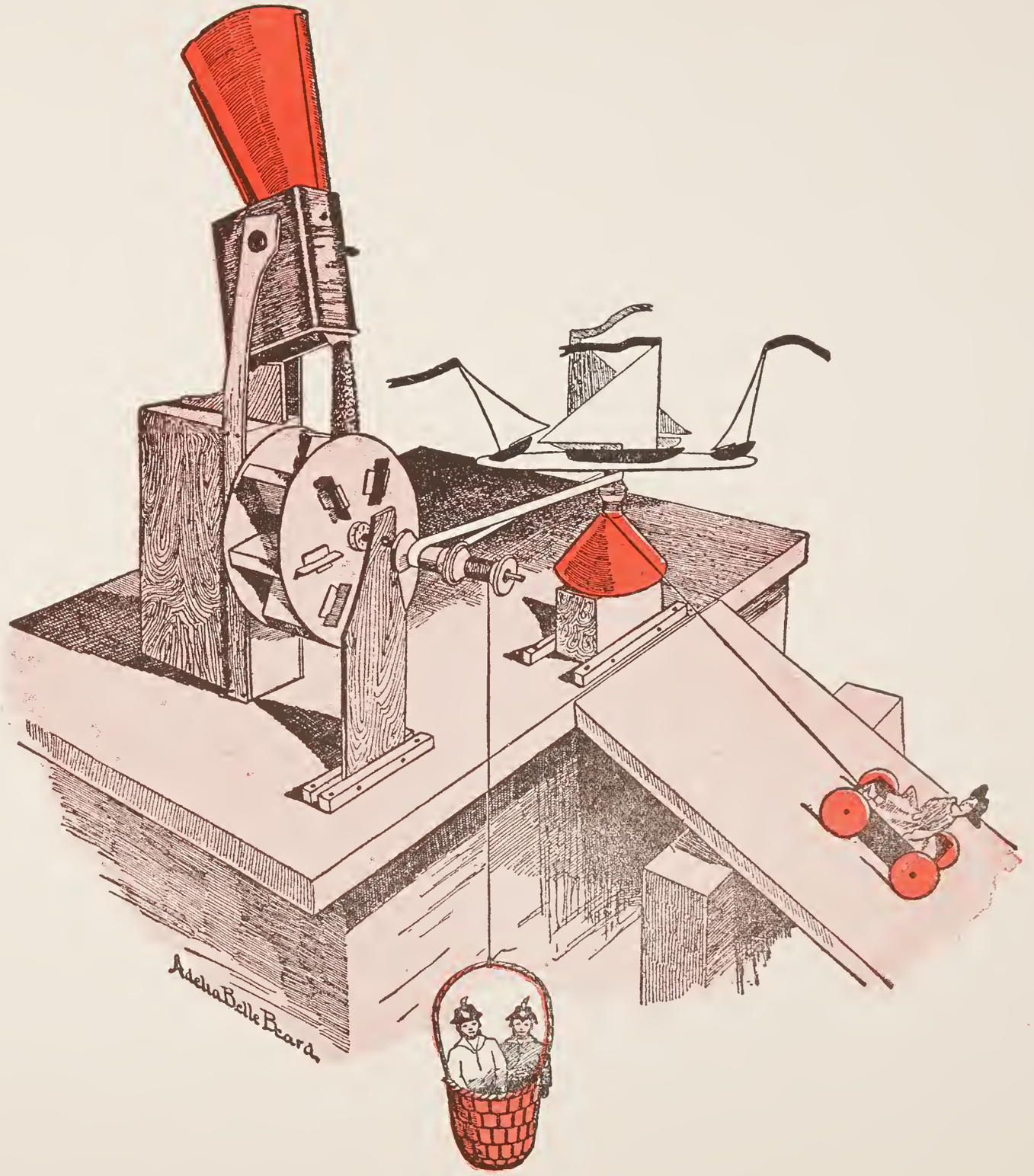
part of each bolt was one inch long and three-eighths of an inch wide and the lower part was half an inch square.

"It is all ready now. See how easy it is to put together, Donald," said Polly, as she bent up the front of a bucket and slipped one of its extensions through a slot in one of the disks and the other extension through a slot in the other disk, and then secured them in place by sliding a bolt through the slot in each extension. (Fig. 7.)

"Better glue those bolts down," said Donald. "When the wheel turns fast they may drop out."

By this time Donald had gathered together all the materials for his sand tower. For the base of the tower he used an empty cigar box, eight inches long and two and one-quarter inches deep, and for the reservoir a cocoa can four inches high and two inches wide at the narrow sides. On each of the wide sides of the can, about one and one-half inches from the top and at equal distances from the side edges. he made a hole by driving a large wire nail through the tin. (I, Figure 4.) In the bottom he cut with a can opener a large hole, as shown in Figure 4. This hole is not in the middle, but at the back, left-hand corner as the can stands upside down. (Figure 4.)

"The funnel goes through this hole," Donald said. "I have made a funnel for



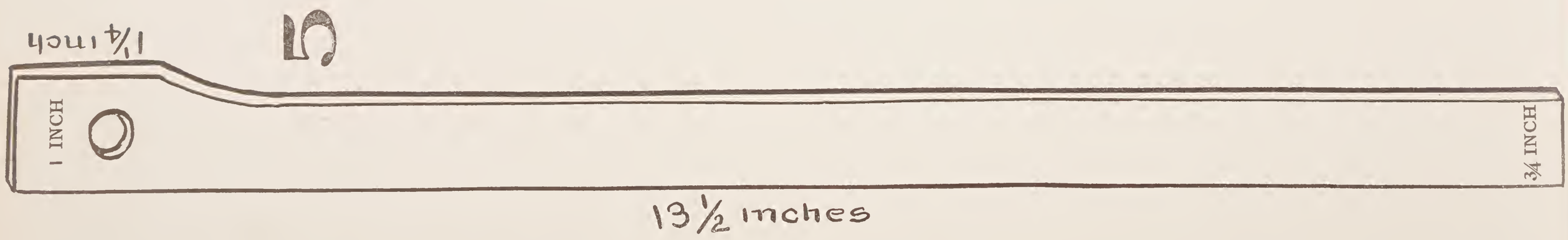
the sand because it holds more than the can and because only a part of the sand will run out of the can without it."

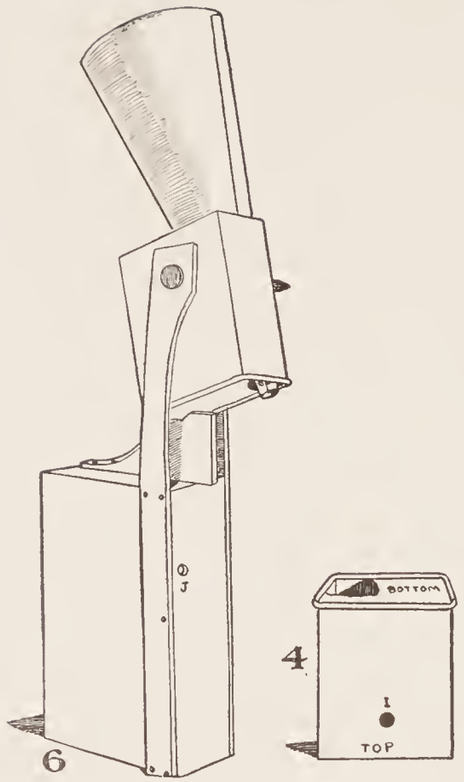
Donald made the funnel of a piece of strong paper twelve inches square. He twisted this into a cornucopia and then trimmed it off evenly at the top and cut the point off at the bottom. He enlarged the bottom opening several times in order to allow a sufficient flow of sand to turn the wheel easily. The lapped edges he pasted securely together. To hold the reservoir up he whittled out of an old shingle two uprights like Figure 5. Each upright was thirteen and one-half inches long and three-quarters of an inch wide, except at the top, where it widened out to one inch. Three-quarters of an inch from the top edge he bored a hole large enough to admit a very large, spikelike wire nail a little over four inches long and quite thick.

"I am going to spike these on," Donald said, thrusting the large nail through the hole in one upright, then through both holes in the can and through the hole in the other upright. "It is a little loose, though," he continued, shaking the can.

"Put a cork on the end of the spike," said Polly; "that will hold it." Donald took her advice and pushed a large, flat cork up on the nail until it fitted snugly against the tin and held it firmly in place. Then he took up the cigar box. "Will you make a hole in this for the shaft of the wheel, Polly? Put it just here," he said, indicating a spot two and one-half inches from the top and half an inch from the left-hand edge as the box stands on end. (J, Figure 6.) "Bore it with a hot wire nail; it will make a smoother surface than the gimlet."

Then Polly, holding her hot nail with a pair of pincers, burned a small round hole in the cigar box and also the hole K in the front upright, Figure 8. This front upright, which was to hold the outer end of the wheel shaft, Donald had whittled from a shingle. He made it six and one-quarter inches high, with a base three and one-half inches wide. Polly was careful to have the hole in the upright the same distance from the bottom of the box, so that the shaft of the wheel would be perfectly horizontal when put through the two holes. Donald used small wire nails for fastening the side uprights to the cigar box. He removed the lid of the box, so that he could easily get at the inside, then drove the nails through the uprights into the side, top and bottom edges of the box. (Figure 6.)





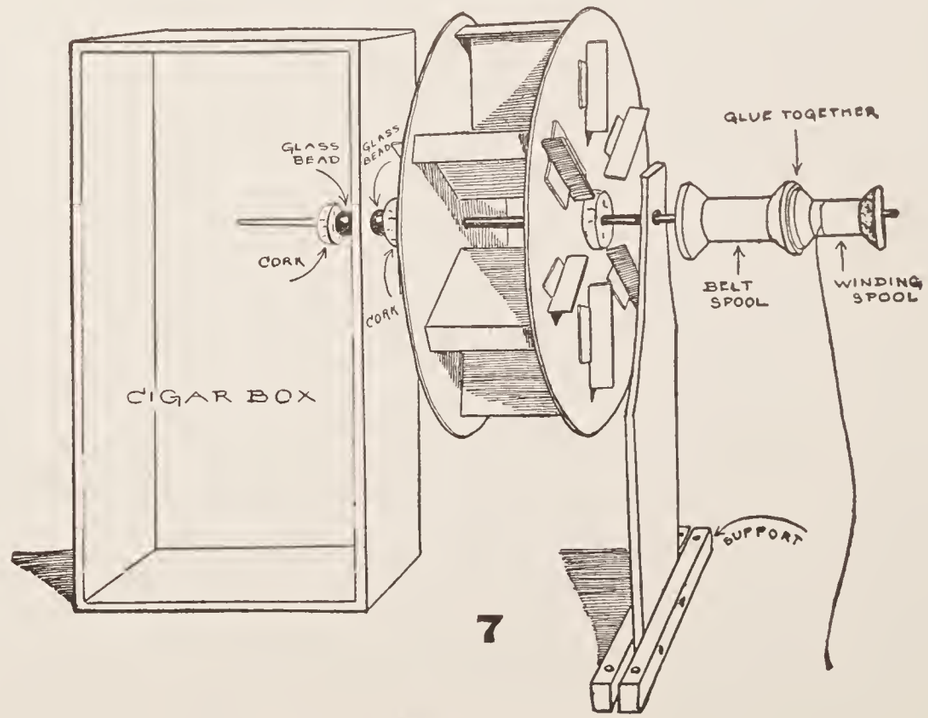
The sand tower was not difficult to make

"I think we will have to nail the tower and other things to a board," he said. "They will never stand firm on the sand." A suitable piece of board could not be found, but Polly begged an old pastry board from the cook and that made a fine flooring for their machinery. Donald stood the sand tower on the board at the lefthand front corner, with the cigar box base just six and one-half inches from the front edge and four inches from the side edge of the board. "I can tack this down from the inside of the box," he said, and using two good sized carpet tacks he drove them through the end of the box into the board. "Now get a shaft for your wheel, Polly, and we will put the wheel up before I nail the front upright in place."

Polly had secured for the shaft of her wheel a long, slender paint brush handle. The brush was a No. 2 bristle oil paint brush, and had cost five cents when new. Exactly at the center of each disk of the wheel she made a puncture and then gradually and with great care pushed her shaft through until the wheel was in the middle and on the largest part of the shaft. Then she cut a medium-sized cork into three slices. The two largest slices she pushed up on the shaft, one from either end, and before settling them in place she put a little glue on the shaft close to the wheel as well as on the inner side of the corks, then pushed the corks up over the glue on the shaft and close against the wheel. In this way the shaft, the corks and the wheel were glued together. "They must all turn together," Polly remarked, "and not like a wheel on an axle." On the end of the shaft which was to rest in the hole in the box, she slid the remaining slice of cork, leaving it within three-quarters of an inch of the cork fastened to the wheel. This was to keep the shaft from running too far into the box.

"Be sure you get the right end of the shaft into the box," Donald cautioned. "Remember, the edges of the buckets bend down when the left side of the wheel is toward you." (Figure 7.)

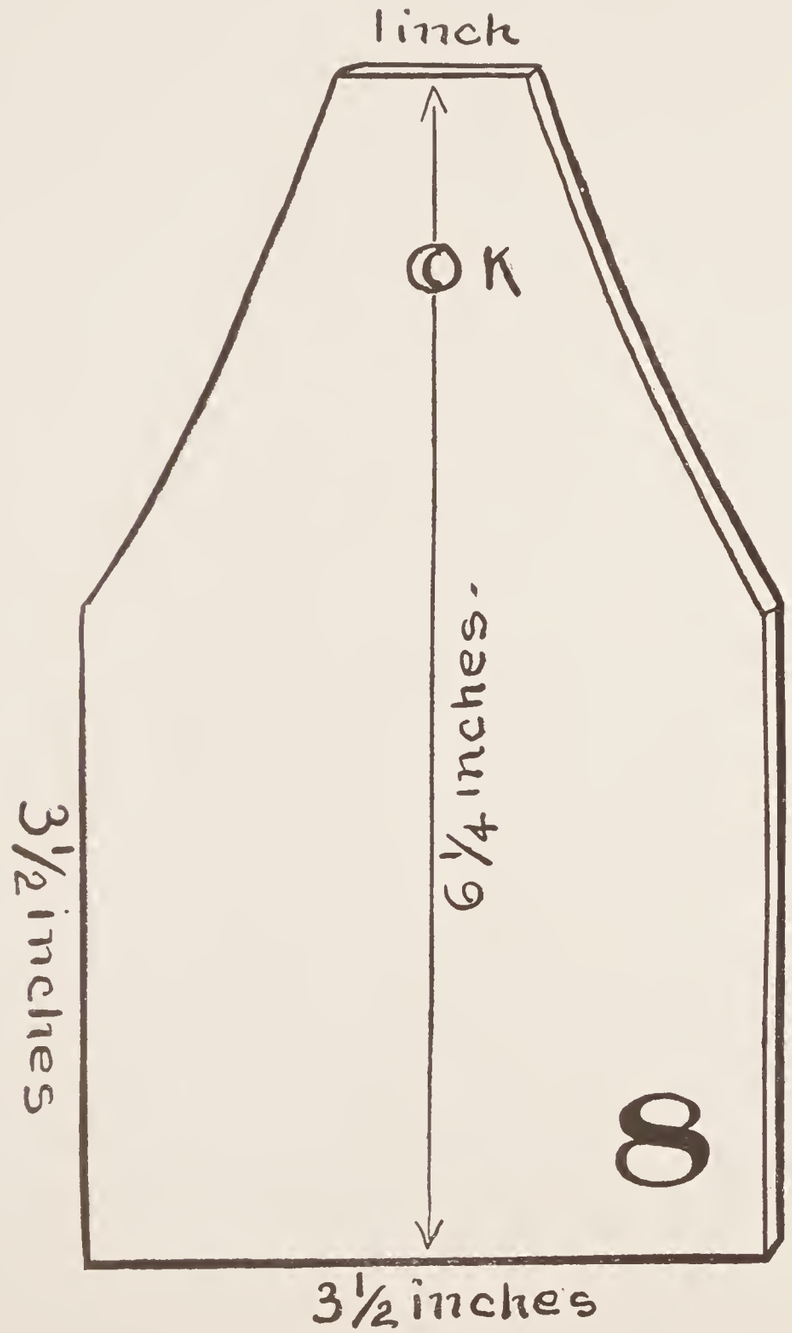
"I know," said Polly. "Now I am going to put this large glass bead on to keep the cork from touching the box. The bead is so smooth and round it will turn easily against the wood." So Polly put her bead on the shaft and slipped the end of the shaft through



The wheel and shaft turn together

the box. "I will put a bead on the inside, too," she added, "and then a cork to keep it from slipping off, and it will have to be a very small cork or it will rub against the side of the box and the shaft won't turn." (Figure 7.)

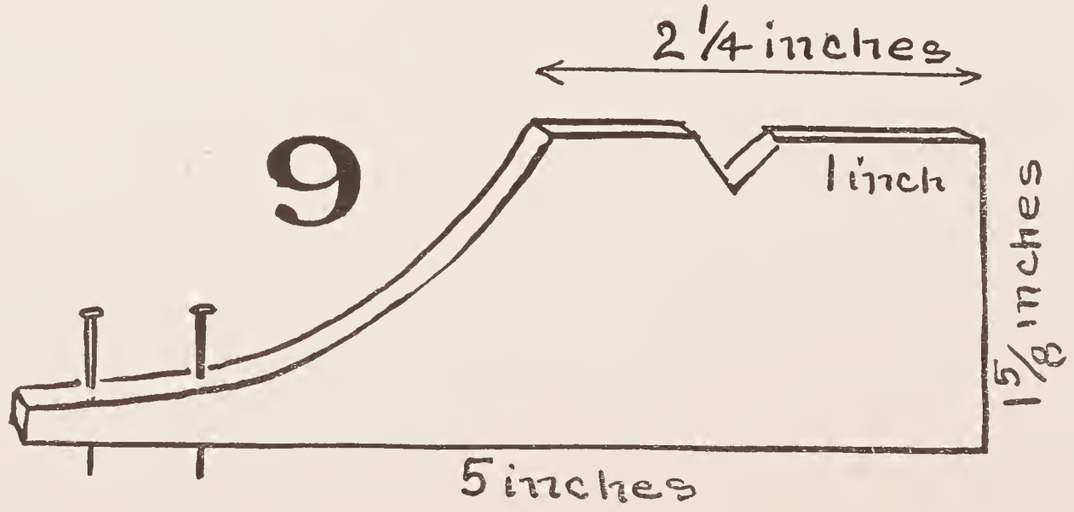
Meanwhile Donald had been devising a way to hold the front upright erect. "I have it now," he exclaimed, and cutting a piece of wood half an inch wide and half an inch thick into two pieces four and one-half inches long, he nailed them to the front and back of the lower edge of the upright; then sliding the free end of the shaft through the hole in the upright, he settled the upright in place in front of the box, a little to the left, so that the hole in the box and the hole in the upright were directly opposite each other and the shaft went through true and straight. Then he nailed the supports to the board. (Figure 7.)



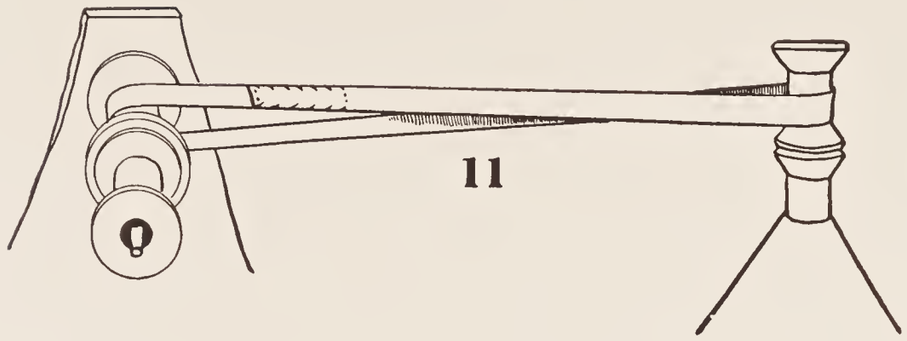
The front upright

When the children adjusted the funnel and filled it with sand they found that to make it work perfectly it was necessary to tilt the can forward in order to send the stream of sand near the outer edge of the wheel, and that something must be invented to hold the can in that position, so Donald quickly whittled out the little brace. (Figure 9.) The brace is five inches long at the bottom, two and one-quarter inches long at the top and one and five-eighths inches high. The V-shaped notch is one inch from the front end.

Fitting the back edge of the can into the notch of the brace, Donald adjusted the brace on top of the box so that the can was held at the required



A brace



angle and the falling sand struck the wheel in the right place; then with two small nails he fastened it on securely. (Figure 6.) Donald also slipped a thin strip of wood between the back of the funnel and the large nail. The wood rested on the bottom of the can and extended up to the top of the funnel.

"That will strengthen it," he said. "The wheel works all right; now we will make it move things."

"Let us have a merry-go-round," Polly suggested.

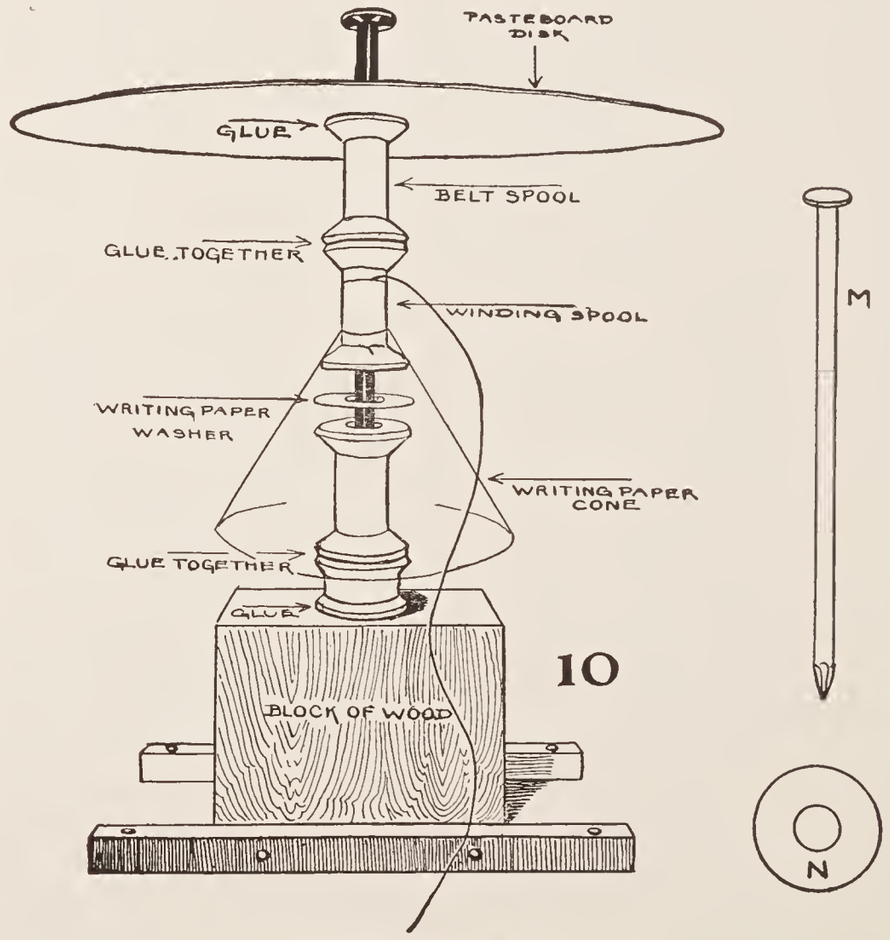
"Yes, and a mine. The wheel will draw the miners up in a bucket, and then I think when the merry-go-round turns it will pull a wagon uphill, too," Donald answered.

"And everything will move at once," Polly cried delightedly.

"We will have to have a belt spool and a winding spool on the end of this shaft," Donald said. "The belt spool will connect it with the merry-go-round and the winding spool will draw up the miner's bucket. The spools must be fastened to the shaft, too, so that they will turn with it."

As the shaft was too slender to fit the holes in the spools, Polly wrapped it with a strip or newspaper. (L, Figure 7.) She used newspaper because it was soft and would cling. She cut a strip about twelve inches long and two inches wide. This she covered on one side with glue; then sticking one end to the shaft about half an inch from the upright, she wrapped the paper tightly around the shaft, making a number of layers, which, glued together, became a solid mass. Donald had selected two spools and glued the ends together—a medium-sized spool for the belt spool and a small spool for the winding spool. When the glue had hardened on the spools and on the paper roll he covered the outside of the roll and the inside of the spools with glue and pushed the spools up on the shaft until they covered the paper roll and stuck fast. (Figure 7.)

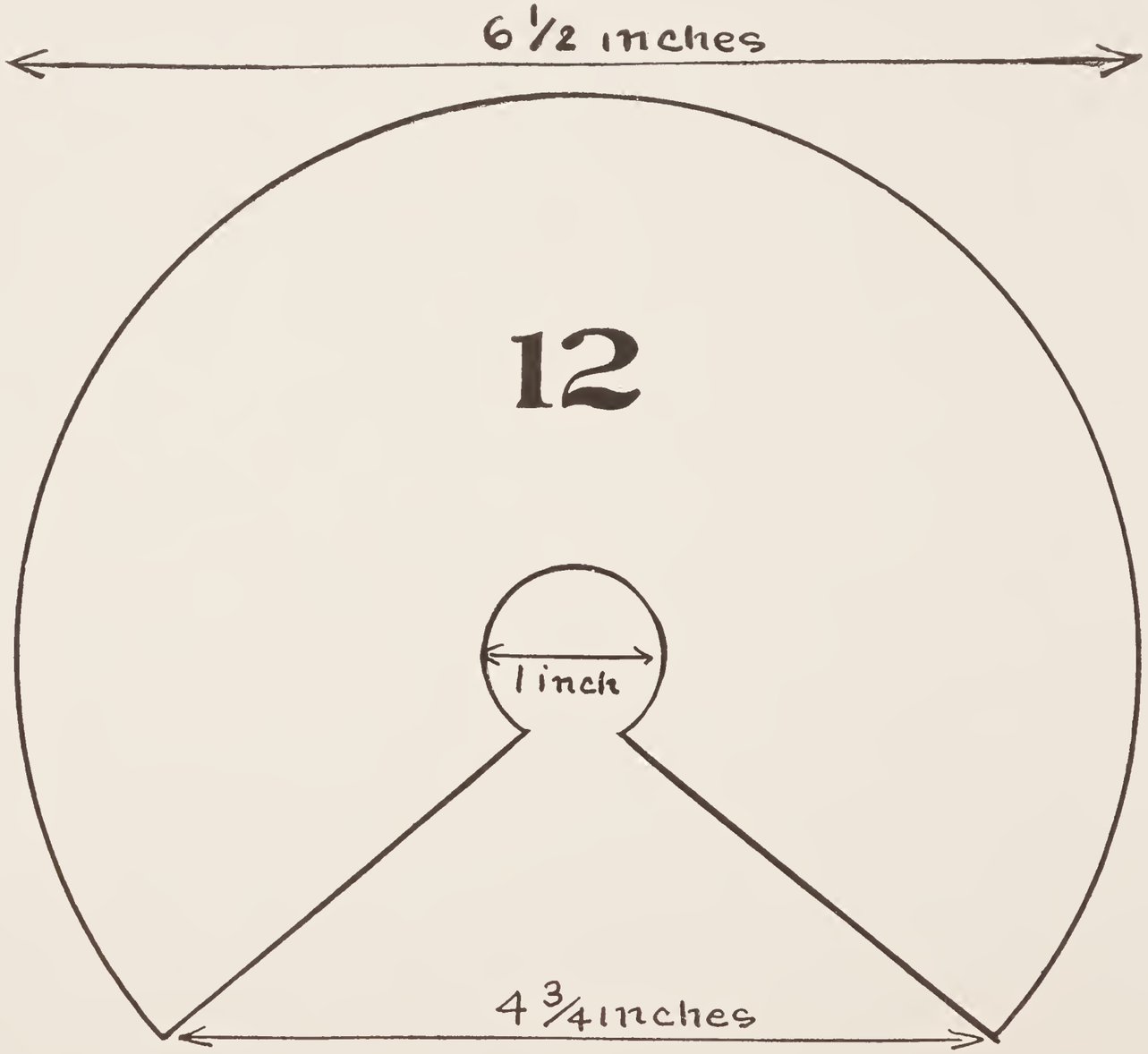
"Now cut a round bristolboard disk for the merry-go-round, Polly," Donald said, "while I rig up a stand for it."



The merry-go-round is built like this

The disk Polly made was seven and one-half inches in diameter with a round hole in the center a little larger than

the hole in a spool, and while she was drawing the circle and cutting it out Donald found a level-sided block of wood, two and one-quarter inches high, for the base of his stand. To this block he nailed small strips of wood, one on either side like the supports on the front upright. (Figure 10.) Then, selecting a medium-sized spool, two smaller spools and a buttonhole twist spool to make the shaft of the merry-go-round the proper height, he glued the two smallest spools together and the larger and buttonhole twist spools together. On top of the smallest spools he glued the disk. Taking a second spikelike wire nail, longer than the one used on the sand tower (M, Figure 10), he slipped it through the disk and the two smallest spools, then stopped and thought a moment. "A washer will have to go on now," he said, "to make these upper spools turn easily on the lower ones." So he cut a washer like N, Figure 10, from a piece of very glossy writing paper, making it a little larger than the end of the spools. "I'll glue these two lower spools to the block before I put the nail through," he continued as he covered the bottom of the buttonhole twist spool with glue and fitted it on top of the block exactly in the middle. He waited a while for the glue to dry; then, placing his paper washer on top of the large spool, he dropped the point of the nail down through the washer and the spools and drove the nail into the block far enough to hold it quite steady, but leaving enough space between the top of the disk and the head of the nail to let the disk turn freely. "We will put the merry-go-round here," Donald went on, as he placed the block directly at the front edge of the board about seven and one-half inches to the right of the sand tower. "It won't do to have it too far from the wheel." Then, driving nails through the strips of wood on either side of the block, he fastened the



The cone

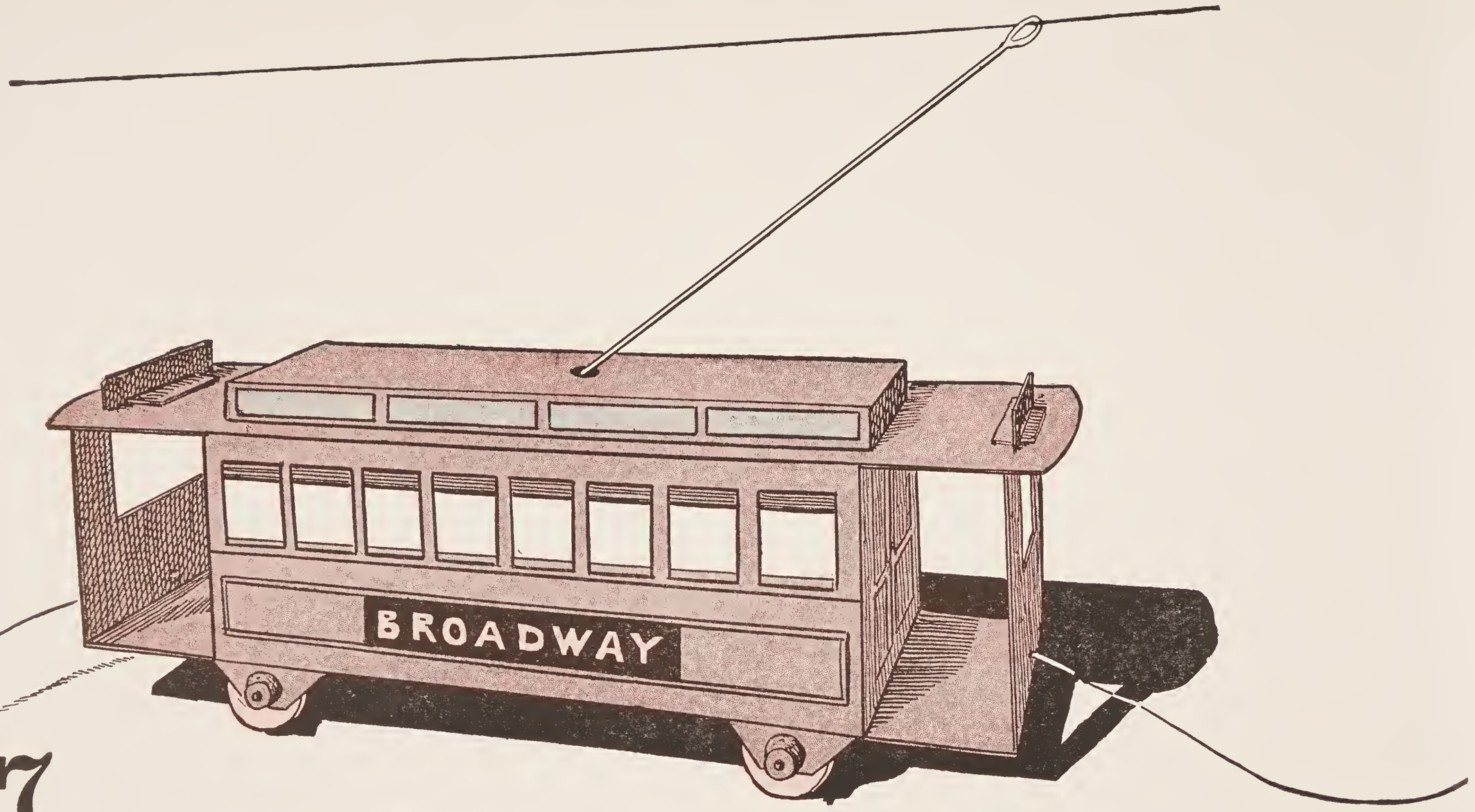
merry-go-round in place. "Now get a piece of tape for the belt, Polly, and we will make her spin," he said. "Get cotton tape; linen is too slippery."

Polly returned with a piece of cotton tape a little over a quarter of an inch wide and about twenty-five inches long. Donald passed it over the belt spool on the wheel shaft and around the belt spool on the merry-go-round shaft (Figure 11) and pinned the lapped ends together. Then Polly poured sand in the funnel of the sand tower and Donald watched the working of the belt, tightening or loosening it as it seemed to require. When it was in perfect working order Polly sewed the ends of the tape together, making a lapped seam, as in Figure 11. Then she proceeded to fasten a piece of thread about a yard and one-quarter long to each of the winding spools. First she placed one end of the thread lengthwise on the spool and then glued a strip of paper around the spool and over the thread. Looking up from her work, she found Donald drawing a circle on a piece of writing paper.

"I am making a cone," he explained, "to fit over the lower spools and prevent the thread from catching on the block."

Donald made the circle for his cone six and one-half inches in diameter, and at the center he cut a round hole large enough to fit around the spool. Out of this circle he cut a pie-shaped slice four and three-quarters inches wide at the outer edge. (Figure 12.) Adjusting the cone on the lower part of the winding spool, he lapped the edges and pasted them together. The cone stood out beyond the side edges, but did not touch the block.

"I am going to put these on the merry-go-round, they will look so pretty 'as they sail, as they sail,'" chanted Polly, showing four little boats she had cut from writing paper and painted in gay colors with watercolor paints. Polly had made the boats with extensions at the bottom, which she slit up through the middle. Bending one half out on one side and the other half out on the other side, she pasted the extensions to the top of the disk near the edge, placing the boats at equal distances apart. By this time Donald had begun a little wagon, making it of a match box by cutting writing paper wheels and pinning them on to the box with ordinary pins, one pin for each wheel. "The wagon must not be heavy," he said, "because our machinery is light." The children chose a small, light toy basket to use as a miner's bucket, and then made two paper doll miners to put in the bucket and a paper doll lady to ride in the wagon. The end of the thread hanging from the winding spool on the wheel shaft they tied to the handle of the basket and the thread fastened to the winding spool on the shaft of the merry-go-round they tied to the front of the wagon. Then they carried the whole thing out on the beach and set it up on an empty box which they had put on top of a little hill of sand to raise it high above the ground. Donald found a smooth board, one end of which he propped up directly under the merry-go-round and on this he set the little wagon, drawing it down the full length of the thread. Polly scooped a hole in the sand for a mine and dropped the little basket in it. Then, all being ready, Polly held her hand under the funnel for a stopper, Donald filled the funnel with *dry* sand, Polly took away her hand, the sand began to run out in a steady stream, the wheel whirled round, the merry-go-round spun merrily, fluttering the tissue-paper pennants on the little boats and tipping them most naturally. The miner's basket emerged from the mine and slowly ascended, and the little wagon climbed up the incline, bearing its lady passenger.



Invented by
Adelia Belle Beard

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How to Make a Trolley Car

By Adelia Belle Beard

One of the Authors of Things Worth Doing

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"POLLY!" called Donald, leaning over the banisters, "I've a jolly good idea this morning and I want you to help me." Polly had been romping with her two fuzzy little kittens in the lower hall, but she promptly deserted them and mounted the stairs on a run.

"What is it?" she cried, appearing at the Kraft Shop door before Donald had reached his seat at the table.

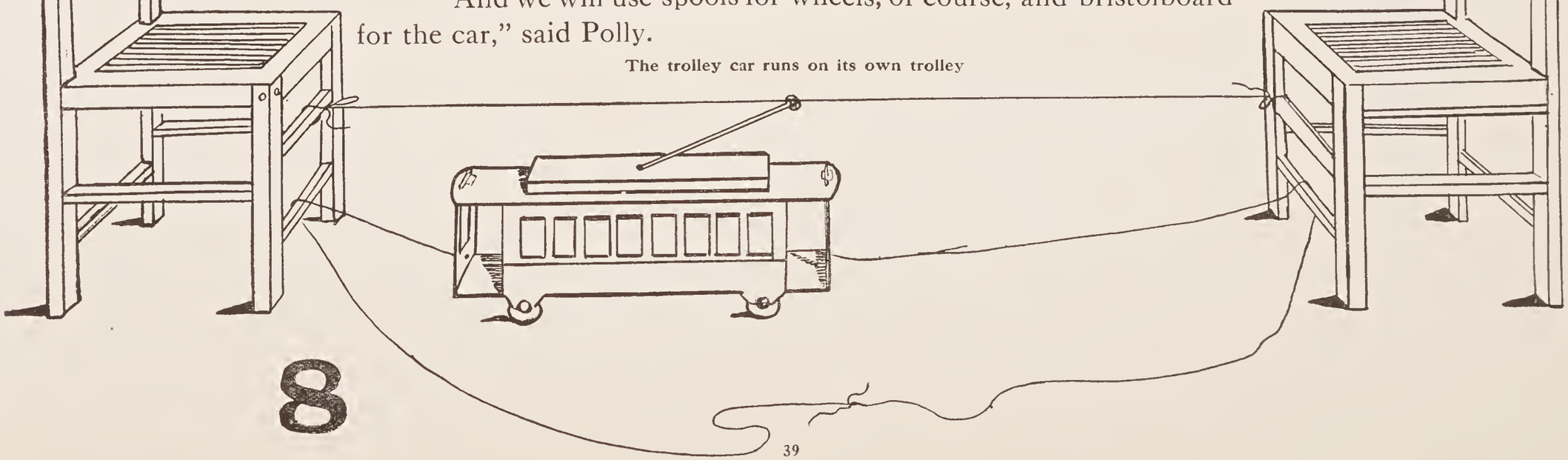
"What do you think of making a little trolley car?" he replied.

"One that will go on a real trolley wire? I think that will be just loads of fun. How long can we have the line?"

"As long as we like, but I will use linen thread instead of wire; it is easier to manage."

"And we will use spools for wheels, of course, and bristolboard for the car," said Polly.

The trolley car runs on its own trolley



"Yes, and I'm going to make as much of the car in one piece as I can."

"Then I don't see what I can do," Polly objected.

"Oh, there will have to be some separate parts," Donald hastened to say. "You can make the little top roof and the trolley pole, and you can get the spools and thread and two little sticks for axles. That will be a big help. Now look at my pattern; you see, I've worked it down until it fits into an oblong, fourteen inches long and seven and one-half inches wide. This takes in the main part of the car, but not the platforms. (Figure 1.) Now I will carry these two lines (J H and J L) down to make a platform and the upright front of the platform. I don't suppose it is called a dashboard."

"Where will you put the other platform?" inquired Polly.

"At the upper right hand corner," said Donald. Then Donald drew below the lines H H and above the lines G G the platform which, for lack of space, is given separately here, but which must be traced and made a part of the pattern by being fitted out at each end of the car.

"This projection," (M) Donald continued, "is to fasten the front of the platform to the roof."

"You haven't made a place for the wheels," said Polly.

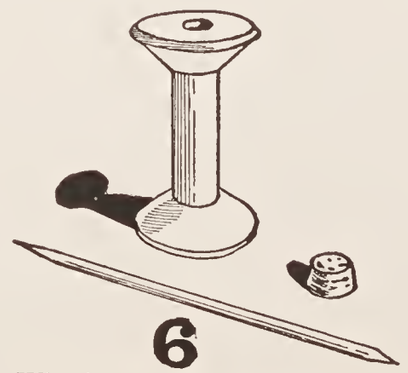
"You're right, I haven't. We will put them here," and Donald drew the axle guards, marked F. "This is the place for the doors," he went on, indicating the spaces at either end of the two sides of the car. "The top part of the door is glass, you know," he said. On the door at the upper left-hand corner (Figure 2) he made the catch B and on the middle line of the lower door he cut the slot B. The inner edge of the slot is on the line, the outer edge is left of the line. The order was reversed on the right-hand side. (Figure 2.) Here he put the catch (A) on the lower door and the slot (A) on the upper door.

"If you will tell me how large you want the little top roof I'll make it now," said Polly.

"All right. I'll draw a place for it, then I'll know," and on the top of the car Donald drew the oblong two and one-quarter inches wide. The top line of the oblong was three-eighths of an inch below the line I I, and the bottom line of the oblong was three-eighths of an inch above the line J J, Figure 2.

"Now I have it," he said. "You must make the little top roof just eight inches long and two and one-quarter inches wide. Draw an oblong exactly that size, you know, for the top. I want it to stand up half an inch above the car, so you must add half an inch at each side and each end, with bend-overs and catches at each corner to hold the sides and ends together, and slits in the sides for the catches. Then make large catches to hold the top roof to the other roof, one catch at each end of each side and one in the middle of each end. (Figure 3.) Be sure and make the side catches half an inch from the end of the oblong."

"You mean," said Polly, "that the neck of the catch must be half an inch from the corner when the sides and ends are bent down."



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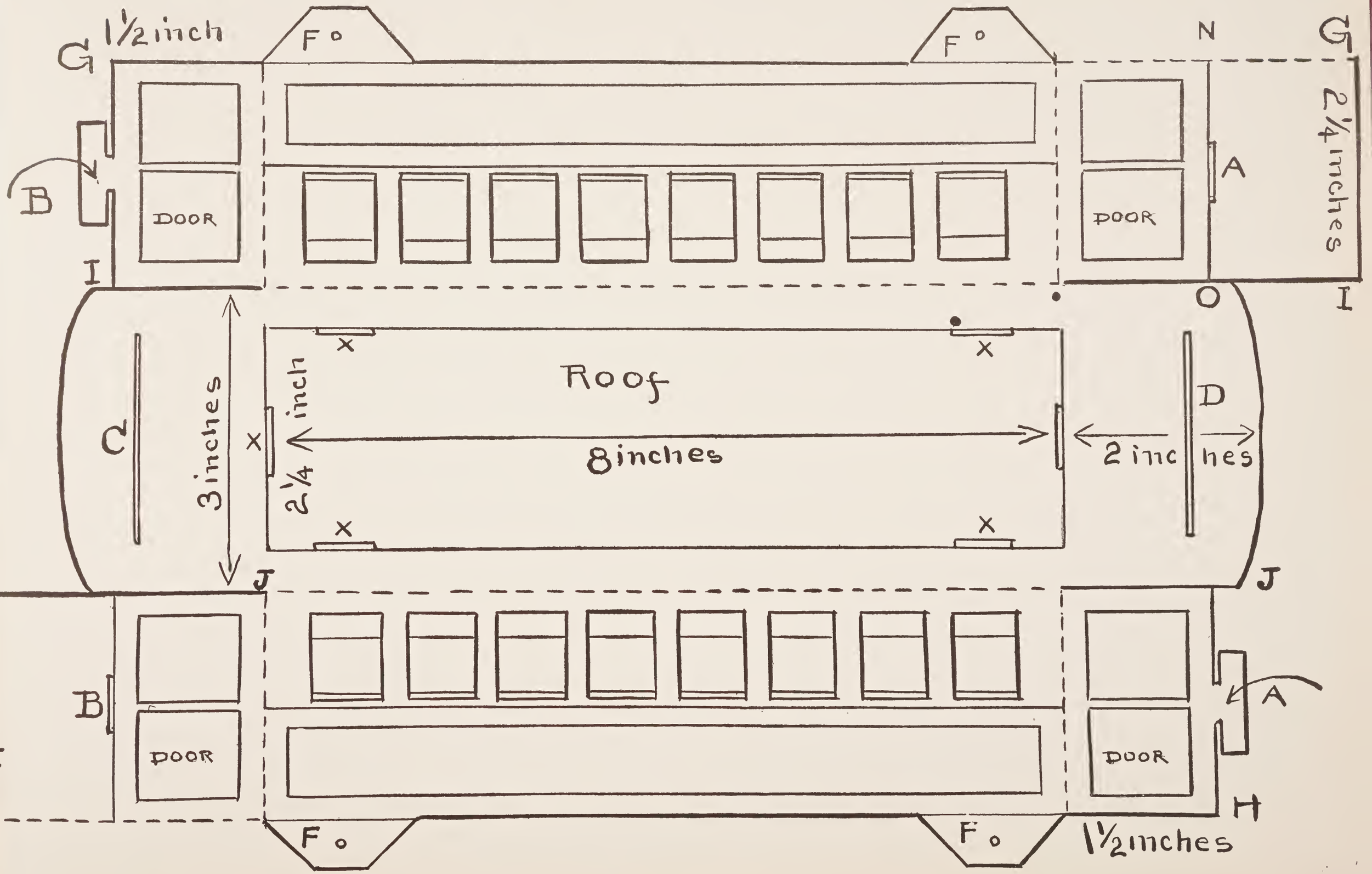
Wheel, axle and hub of the car


G
1½ inch
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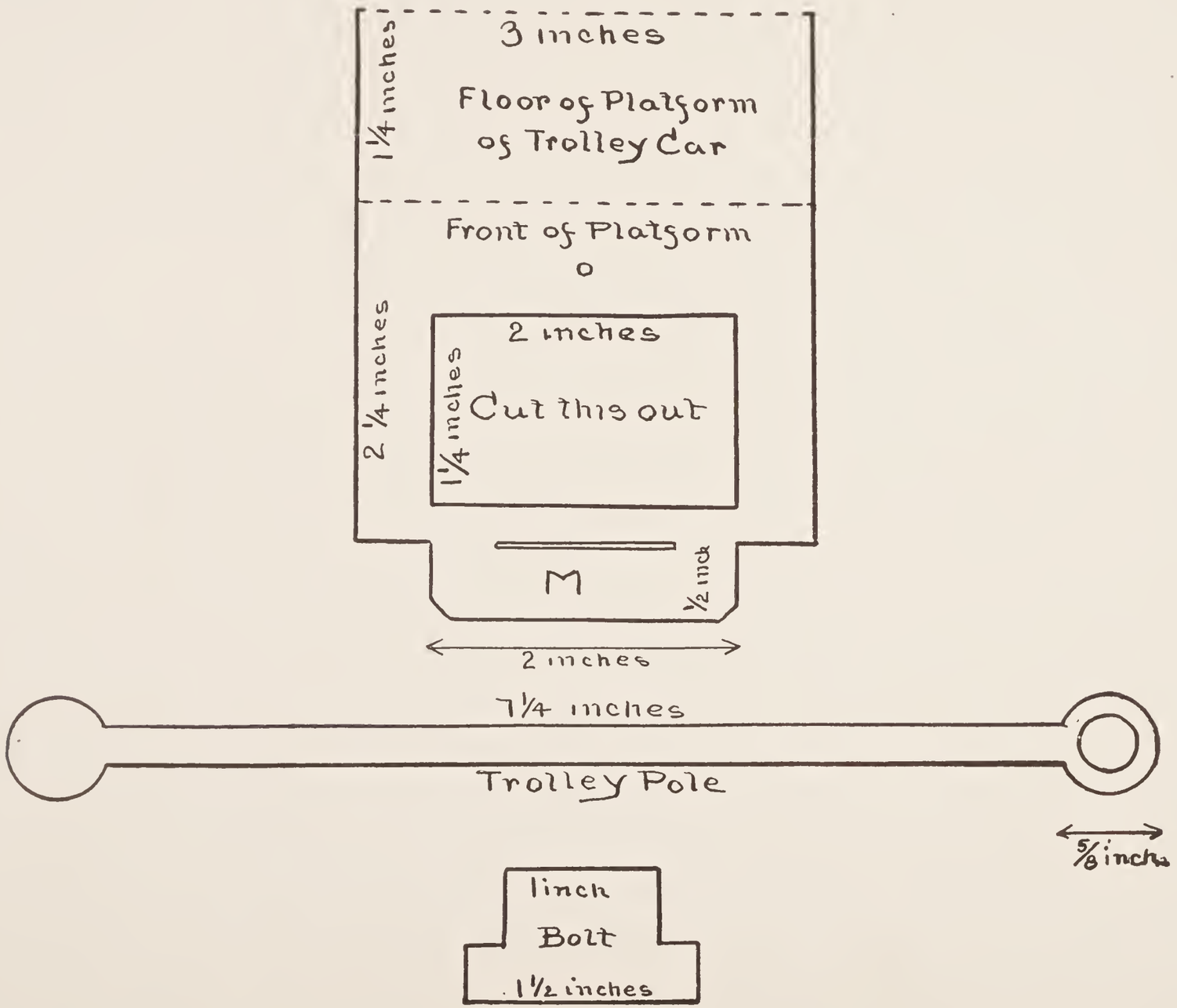
"That's it, and make the neck half an inch wide and the catch about one inch long from end to end. Don't forget the hole in the middle of the roof for the trolley pole," Donald added. "Make it not quite half an inch in diameter. (Figure 3.) Then Donald drew slots for the catches in the oblong on top of his car, placing them to correspond with the catches on the top roof and making them a little more than half an inch long. He placed each side slot just half an inch from the ends of the oblong, and all inside the boundary line.



"Now I will draw in the windows, eight on each side," he announced, spacing them off carefully with a rule. He made each window three-quarters of an inch wide and seven-eighths of an inch high, allowing one-quarter of an inch space between. Then on the front of each platform he drew an opening two inches wide and one and one-quarter inches high. On a line with the lower edge of the front of the bottom, in the middle of the projection, he drew a slot a little over one inch long (Figure 2), and on the roof extension at each end of the car he made a slot a little over two inches long, C and D, page 41. These slots are one and one-quarter inches from the end lines of the middle oblong on the roof.

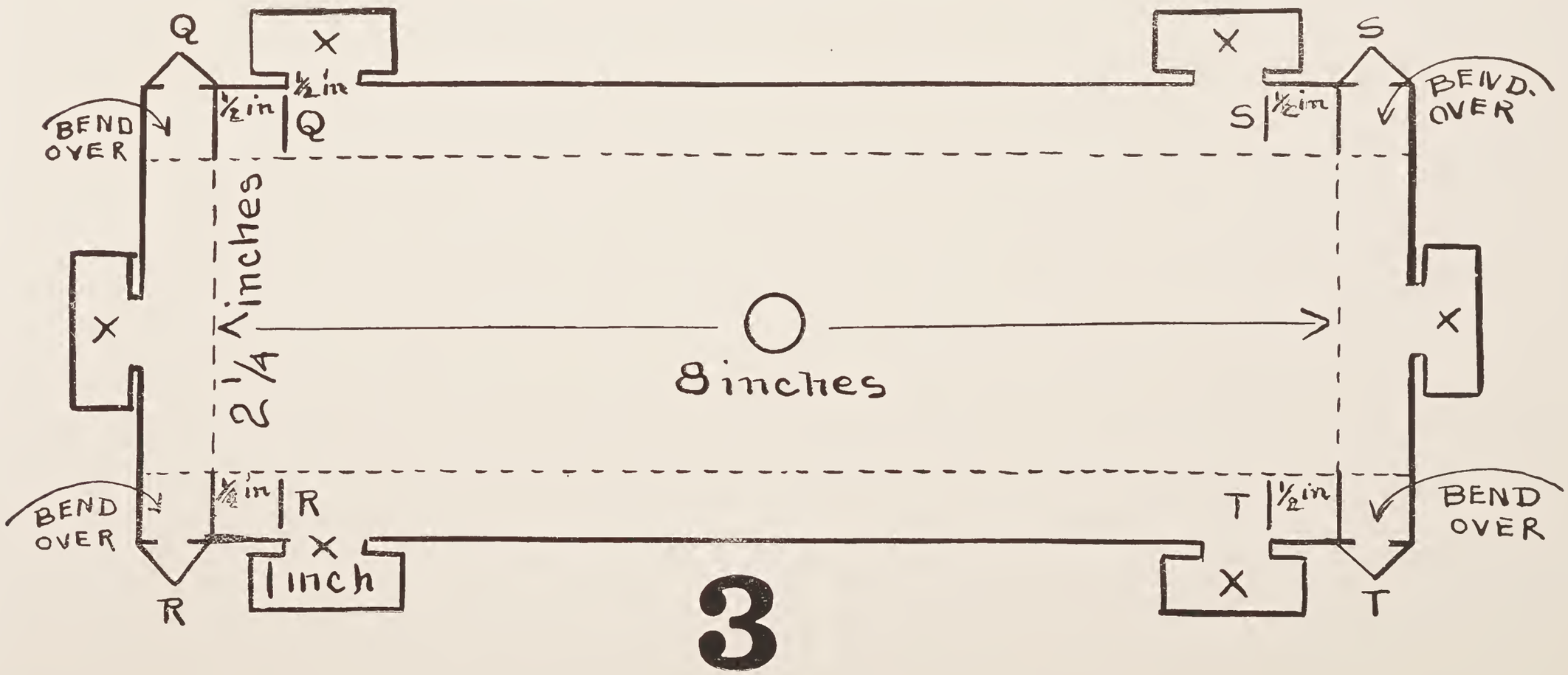
"My car is ready to cut out now," said Donald.

"So is my top roof," said Polly. "Is the trolley pole all right?"

Polly had made the pole seven and one-half inches long and one-quarter of an inch wide, with a ring at one end five-eighths of an inch in diameter, and a ball as the other end one-half an inch in diameter. (Figure 4.)

Donald pronounced the pole "first rate." "Put the ball through the hole, Polly," he said. So when Polly had cut out the roof according to the heavy lines and bent down the sides and ends according to the dotted lines (Figure 3), she turned in one edge of the ball and pushed it through the round hole in the roof. When she flattencd the ball out again it could not slip through the hole, but the pole could be moved in any direction.

Donald cut out his car according to the heavy lines and bent it according to the dotted lines. Both he and Polly remembered to score the dotted lines lightly with the edge of a pocket knife before bending them. The sides of the car Donald bent down; the doors he bent inward to meet under the projecting roof; the platform he turned out and the front of the platform up. Before fastening the catches and projections in their slots he fitted the top roof on the car, putting the catches marked X through the slots marked X. First he bent both ends of each catch inward, which made them narrow enough to slide through the slots, then he pushed the catches through the slots, settled the top roof firmly on the main



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roof and opened the catches on the inside of the car. When this was done he fastened the doors by putting the catch B through the slot B in the opposite half of one door, and the catch A through the slot A on the opposite half of the other door. The projections at the top of the fronts of the two platforms he pushed through their corresponding slots in the roof.

"Hello! we've forgotten the bolts for these projections," Donald suddenly exclaimed.

"I'll make them while you put on the wheels," said Polly. Then she cut two bolts like Figure 5, making them one and one-half inches wide at the bottom and one inch wide at the top. When the bolts were slipped through the slots in the projections C and D they held the fronts of the platforms securely in place. The two spools that Polly had selected for wheels were like Figure 6, each about two inches high, and the slender, round sticks, pointed at each end, were four inches long. Donald slipped a spool on one of the sticks, then pushed one end of the stick through the middle of one of the axle guards from the inside, and the other end of the stick through the middle of the opposite axle guard.

"Here are the hubs," said Polly, producing four small corks. Then Donald pushed a cork on each end of the stick. The corks kept the axle from slipping out of place. He adjusted the other spool in the same way, then threaded a large needle with a piece of linen thread several yards long and pushed the needle through the front of the platform below the opening at the place marked with a dot in Figure 2. A large knot on the inside of the front of the platform held the string in place and the needle was again threaded with a long thread to fasten on the other end of the car. (Figure 7.)

"Now for the trolley wire," exclaimed Polly. "How shall we put that up?"

"This way," said Donald, and he placed two chairs at opposite ends of the room, then he cut a piece of thread a little longer than the space between the chairs and tied one end to the top rung of one chair. The other end of the thread he passed through the ring in the top of the trolley pole and then tied it to the top rung of the other chair.

"There we are. Now, Polly, you sit down by the chair and take hold of one thread, and I will sit by this chair and hold the other thread. When you pull your thread the car will run all the way to your chair; when I pull my thread back it will come to me."

The children kept the little car running back and forth for some time and were vastly entertained. When they wished, they had it make several stops to allow imaginary passengers to get off and on, and again it was an express car, and went from one end of the line to the other without stopping. Finally Donald was called away to go an errand and Polly discovered that she could work the car entirely alone by running the loose ends of the threads over the lower rungs of the chairs, tying the two ends together and pulling the thread first one way, then the other. Figure 8 shows the trolley in working order with the threads tied together in the way Polly devised.

Making Toy Furniture Without Glue

By Adelia Belle Beard

"I AM going to have a Kraft Shop, a Kraft Shop!" sang Polly, noisily pulling out the old and much-battered table in the children's play room and then skipping excitedly around to hunt up scissors, knife, ruler and pencils, the tools she thought would be necessary. Donald watched proceedings over the top of his book. Things were beginning to look interesting. "What do you know about Kraft Shops?"

"Everything. Mother told me and, besides, I went through a real Kraft Shop last summer and saw all the people at work.

"What were they making?"

"Why—er—I am not sure that I quite remember just what they were making, but I know they do make beau-ti-ful things, and all with their hands, too. They don't use machinery at all. That's what I'm going to do, and you, too, Donald. I don't want to be a Krafter all by myself. Mother said it would be nice if you and I started a home Kraft Shop and made toys and all sorts of things."

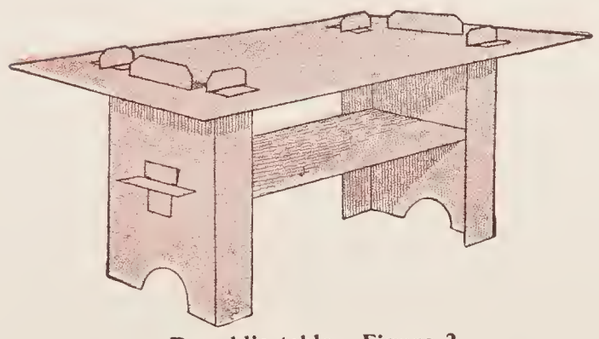
Donald's book closed with a snap. "All right, I'm ready. What shall we try first?"

"Suppose we make toy furniture and call it—oh, I know, we will call it Kraft-Shop furniture, and pretend that it's real."

"First rate; but I'll have to get some wood."

"No you won't; we can make it of this cardboard; it will be easier to cut, anyway."

"That is bristolboard, but it is better than cardboard, stronger and tougher, you know, and we can put the furniture together with pegs, just as if it were of wood."



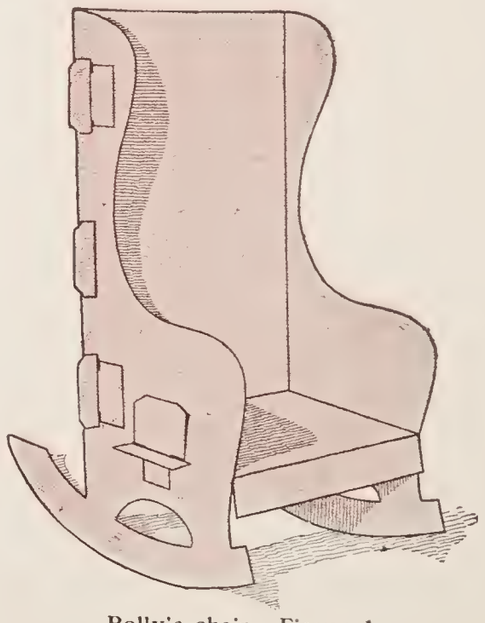
Donald's table. Figure 2

"Yes, yes!" said Polly, jumping up and down in her enthusiasm. "That's it. I was sure you would know how. What will you make?"

"A table, I think—a library table."

"Then I'll make an armchair, and, Donald, it is going to have rockers, too."

"How about bookshelves, Polly? They would make the library set complete."

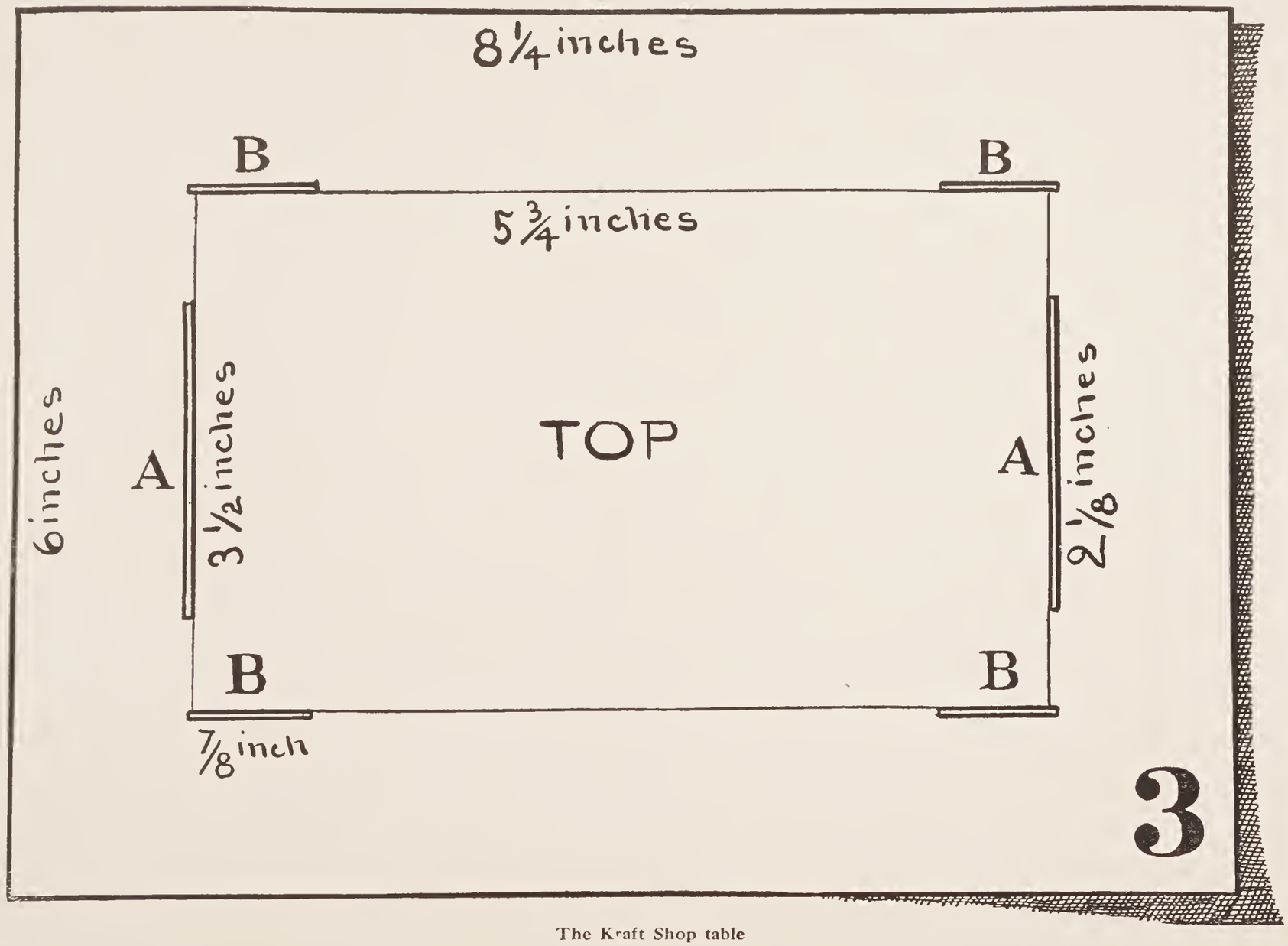


Polly's chair. Figure 1

"Dear me! Of course we must have the shelves. Now let's begin this very minute."

"Well, get the furniture advertisements you saved—the pictures, you know. They will give us ideas, but we won't have to copy them exactly."

After many experiments and alterations, and with much fitting together of the various parts, Donald finished his table, Polly her chair, and together they worked out the bookshelves, using bolts for the shelves, instead of pegs, to hold them together. Here they are, Figures 1, 2, and 16.



The Kraft Shop table

"They are good and strong, Donald said.

"And so pretty," Polly added.

"And we didn't use a bit of glue," continued Donald, proudly.

"And I can put cushions in my chair if I like—real huffy, puffy cushions."

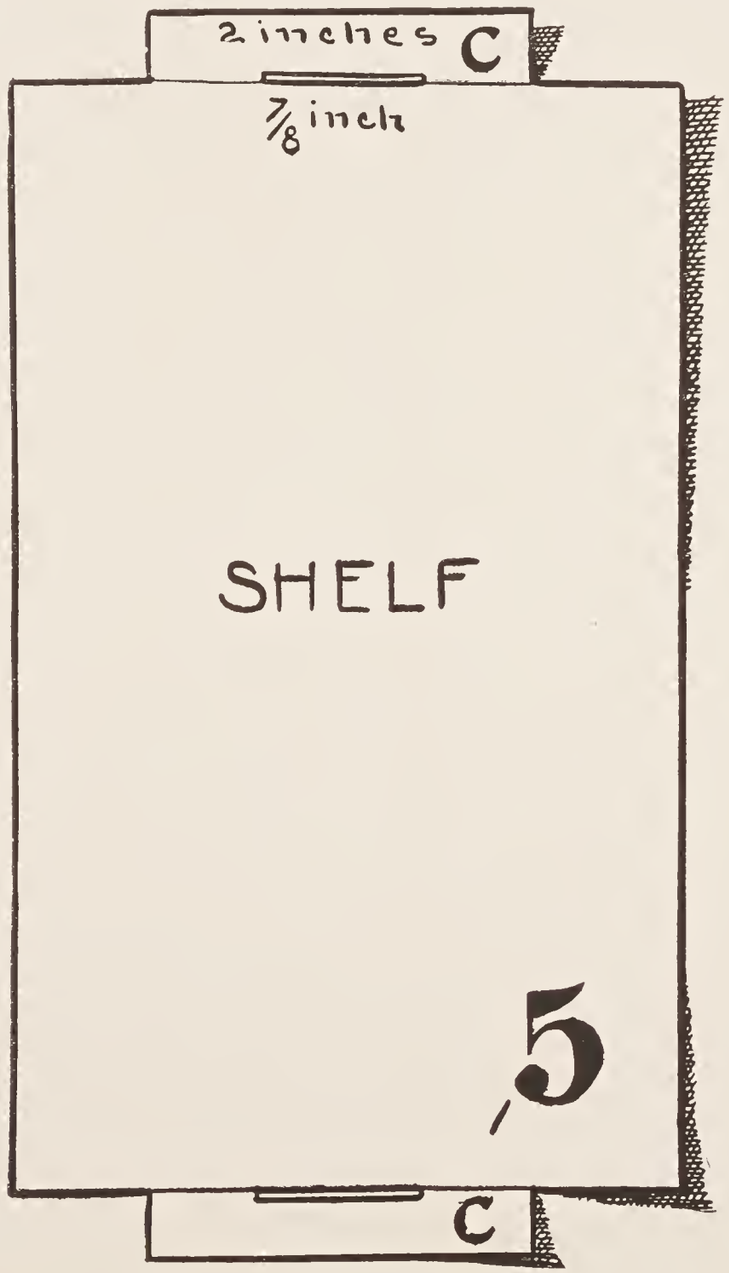
"And little books on the shelves," suggested Donald.

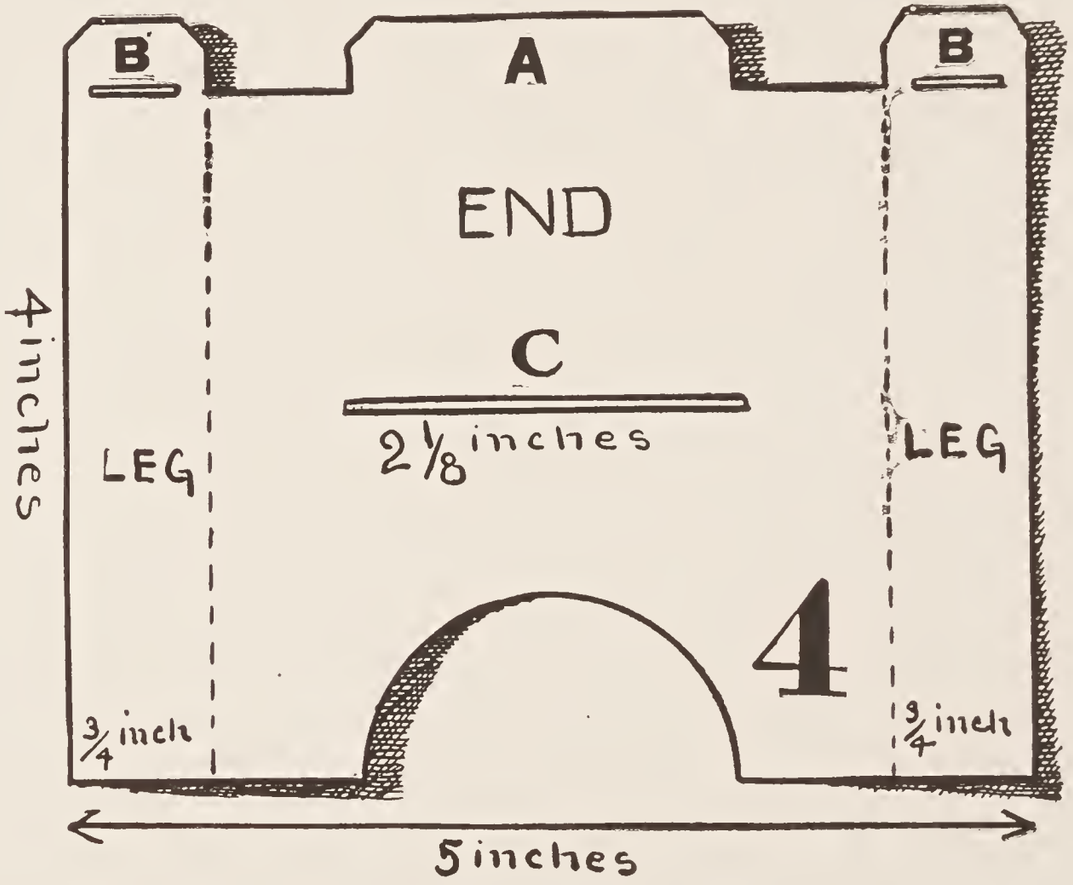
"Oh!" breathed Polly, estatically; "and, Donald, we can take them all apart and pack them in a flat box. Isn't that fine?"

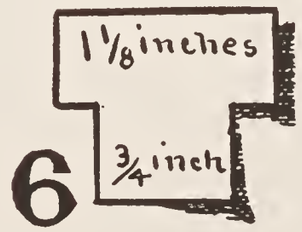
"It just is."

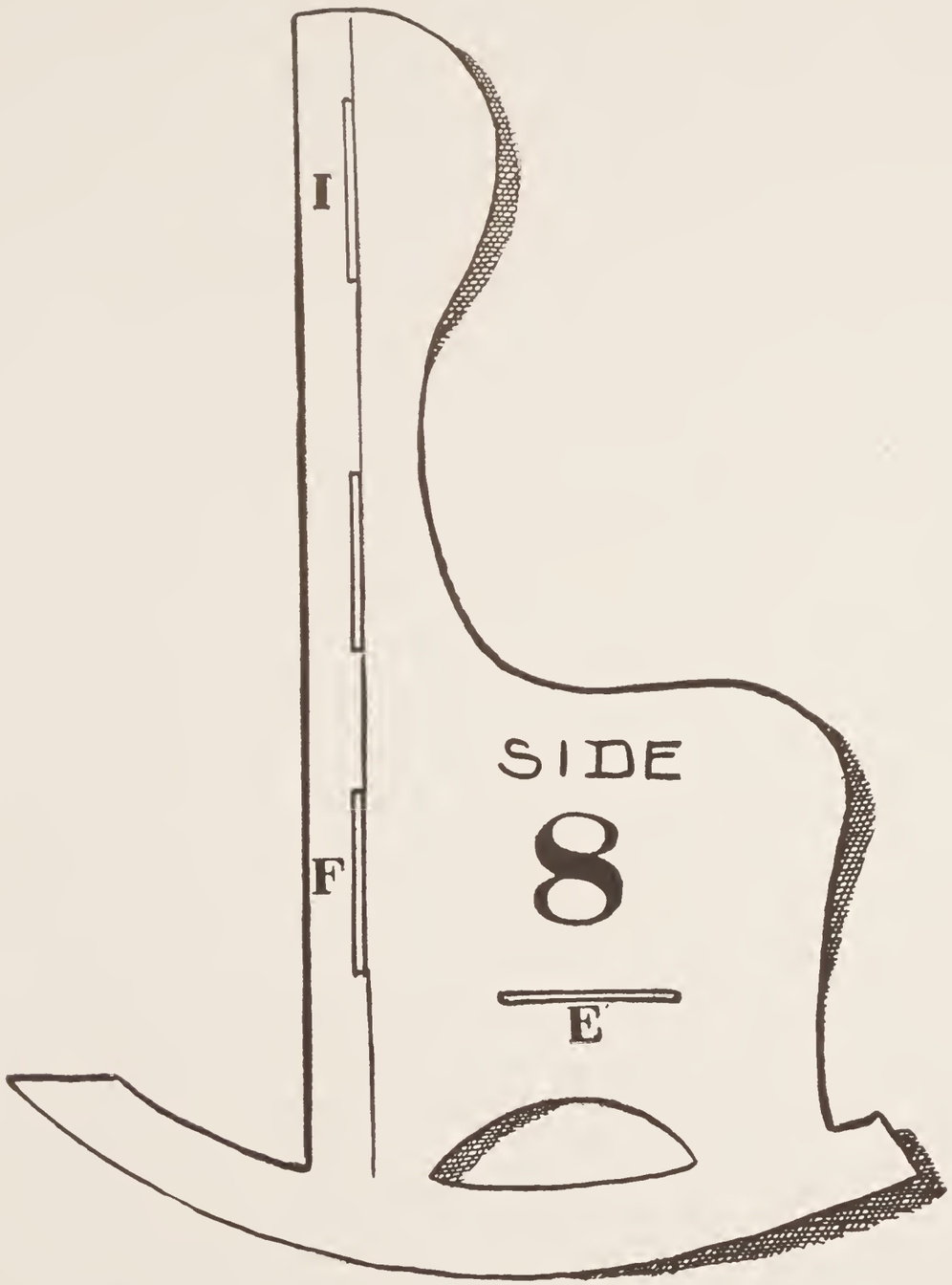
Donald made the top of his table first. With careful measurements he drew on the smooth bristol-board an oblong eight and one-quarter inches long and six inches wide (Fig. 3),

which he cut out with the large shears. Within that oblong he drew another five and three-quarter inches long and three and one-half inches wide. This left a border one and one-quarter inches wide all around the center oblong. At the sides and ends of the inner oblong he drew lines for slits, as shown in Figure 3. The inside edge of each slit is *on* the outline of the oblong, and the outside edge *outside* of the oblong. The end slits (A A) are two and one-eighth inches long and the side slits (B B B B) are seven-eighths of an inch long, and extend a little beyond the end lines of the inner oblong. He cut








I
F
SIDE
8
E

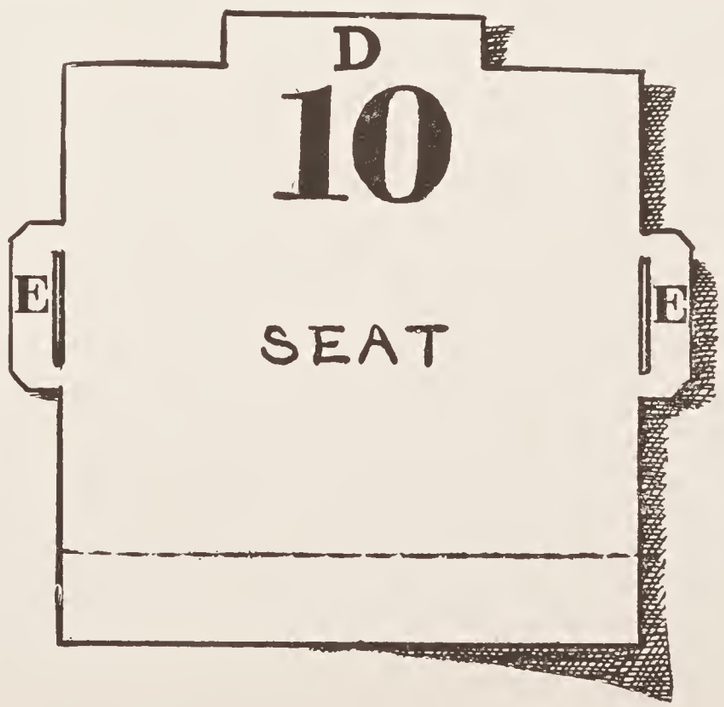
I
I
BACK
9
F
F
D

these slits with a sharp knife and made them about one-sixteenth of an inch wide, which is a little more than the thickness of the bristol-board. The two end supports of the table Donald made like Figure 4, which is cut from an oblong five inches wide and four inches high. The real end of the table, from dotted line to dotted line, is three and one-half inches wide, just the width of the inner oblong on the top of the table, under which it must fit. The parts to the right and left of these dotted lines are the table legs. The projection in the middle, at the top, is two inches long and three-eighths of an inch high. The projections at the ends just over the table legs are the same height. Slits are cut in these projections one-half an inch long, with the *lower* edge of each slit on a line with the top edge of the end pieces, as shown in Figure 4.

In the middle of each end piece, two inches from the bottom, there is another slit, two and one-eighth inches long, for holding the shelf, and the bottom is cut in a half-circle arch. When the end pieces were completed Donald scored the dotted lines by lightly drawing the blade of his knife down their entire length. Then he bent the bristol-board along these lines so that the table legs faced the sides.

Without the projections CC the shelf (Figure 5) is formed of an oblong exactly the size of the inner oblong on the table top. The projections are two inches long and a quarter of an inch wide. In these are cut slits seven-eighths of an inch long, and the slits are outside of the lines of the oblong, just as the slits are outside of the lines of the oblong on the table top.

Donald put all these parts together, slipping the projections A through the slits A, the projections B through the slits B, and the projections C through the slits C, and was delighted to find they fit perfectly. Then he made pegs like Figures 6 and 7; two like Figure 6, which is three-quarters of an inch wide at the bottom, one and one-eighth inches wide at the top and one inch high; and four like Figure 7, which is three-eighths of an inch wide at the bottom, five-eighths of an inch wide at the top and three-quarters of an inch high. He slid the two pegs (Figure 6) through the slits in the shelf, and the four pegs (Figure 7) through the slits in the projections above the table legs, and the stanch little table (Figure 1) was complete. He dropped it on the floor; it did not break. He tossed it into the air; its joints held firmly. Then Donald was satisfied with his work.



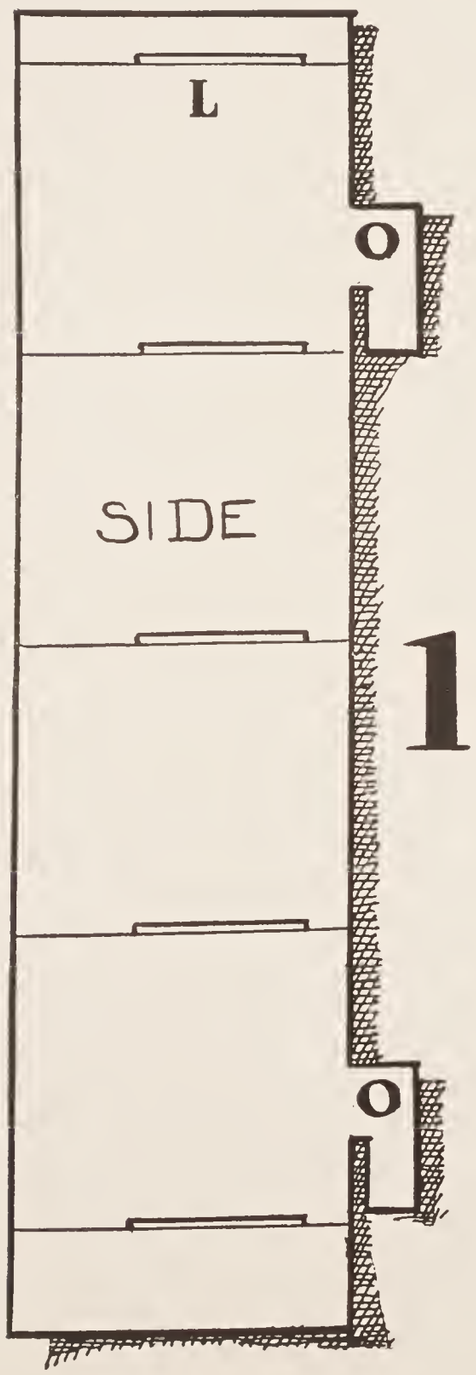
Polly made her chair in three parts, not counting the pegs. First she drew the two sides (Figure 8), which are six and three-quarter inches high, and three inches wide from front of arm to back edge.

The rockers are five inches long from end to end and one-half an inch wide. One-quarter of an inch from the back edge Polly drew a straight line, extending it from the top edge of the chair to the top of the rocker (Figure 8), and along this line she cut three slits, each slit just one inch long. The top of the first slit is half an inch from the top edge of the chair; the top of the second slit one inch below the first slit; and the top of the third slit is three-quarters of an inch below the second slit. Just above the rocker she cut an arch half an inch high, and half an inch above the arch she made a horizontal slit one inch long. This finished the two sides of the chair.

For the back Polly drew an oblong six inches long and three inches wide. To this she added three projections on either side one-quarter of an inch wide. She spaced the projections exactly as she did the slits in the sides of the chair, making them each one inch long. Then, to allow them to pass easily through the slits, she cut a fraction off each end of each projection, which left the projections seven-eighths of an inch long. In the two top and two bottom projections there are slits for the pegs half an inch long, and three-quarters of an inch above the bottom edge there is a horizontal slit one and one-half inches long (Figure 9.)

Figure 10 shows the seat which Polly made, three inches square, then added three projections one-quarter of an inch wide. The side projections are seven-eighths of an inch long and the back projection one and three-eighths inches long. Slits five-eighths of an inch long are cut in the side projections. The dotted line one-half inch above the bottom edge (Fig. 10) shows where the seat is scored to be bent down in front (Figure 2.) Of the six pegs needed for the chair, four are three-eighths of an inch wide at the bottom, not quite an inch wide at the top and three-quarters of an inch high (Figure 11.) The other two pegs are half an inch wide at the

bottom, one inch wide at the top and one and one-quarter inches high (Figure 12.) Polly fitted the two sides of the chair to the back, sliding the projections on the back (II FF) through their corresponding slits (I F) in the sides, and fitted the seat to the back and sides, slipping the projection D through the slit D and the projections EE through the slits EE. Then she pegged them all together, using the pegs (Figure 11) for the slits II FF, and the pegs (Figure 12) for the slits EE. When it was finished she set the chair to rocking and clapped her hands with delight to see how perfect it was.



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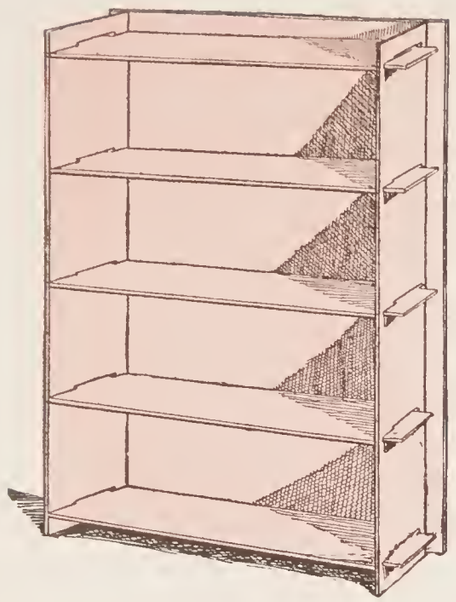
When the children made the book-shelves (Figure 16) they cut an oblong for the back piece six and one-quarter inches high and five inches wide (Figure 13.) On either side of this oblong, one-quarter of an inch from the edge, they drew straight lines from top to bottom; then, between these lines, they marked the position of the shelves with five horizontal lines one and one-half inches apart, making the first line one-quarter of an inch from the top edge. On either side of the back piece they made slits to hold the bolts on the side pieces (OO OO) (Figure 13.) The inner edge of these slits is *on* the side lines and the outer edge *outside* the side lines, and the slits are each three-quarters of an inch long. The top slits are five-eighths of an inch from the top edge and the bottom slits are one inch from the bottom edge of the back piece.

Of course the side pieces had to be made exactly as high as the back piece, six and three-quarters inches, and the children decided that one and three-quarters inches was a good width, but this width does not include the bolts (OO) (Figure 15.) The bolts are three-eighths of an inch wide at their widest part and a trifle less than three-quarters of an inch long, so that they will slip easily through the slits. The necks of the bolts measure three-eighths of an inch from top to bottom.

"Look out, Polly!" exclaimed Donald, suddenly. "You are not getting those in the right places. The lower edge of the neck of the top bolt *has* to be the same distance from the top edge of the side piece as the lower end of the top slit is from the top edge of the back piece, because it rests upon it. Don't you see?"



"Yes, I see," said Polly. "That will make it one and three-eighths inches from the top edge. And by the same token the bottom edge of the neck of the lower bolt must be just one inch above the bottom edge of the side piece, for the lower slit is one inch from the bottom edge of the back piece. Is that right?"

"You've got it," answered Donald.

"That is the way it works; now draw the shelf lines across your side pieces to correspond to those on the back piece, and make them exactly the same distance apart. The top line must be one-quarter of an inch from the top edge, remember."

Along the shelf lines Polly made slits for holding the shelves (L, Figure 15); the lower edge of each slit is *on* the line, the upper edge of the slit *above* the line. Each slit is three-quarters of an inch long. The left-hand ends of the slits are five-eighths of an inch from the left edge of the side piece.

Figure 14 is the shelf. Donald made five of these shelves. They are four and one-half inches long; not including the bolts, and one and three-quarter inches wide, just the width of the side pieces. The bolts LL are the same size as the bolts OO on the side pieces. The lower edge of the neck of each bolt is five-eighths of an inch from the bottom edge of the shelf. The bottom edge of Figure 14 is the front edge of the shelf when it is put up.

When all the parts were finished the children first fitted the shelves to the side-pieces, sliding the bolts L through the slits L and pushing them forward until the bolts held fast and each shelf fitted the sides exactly. Then they slid the slits O in the back over the bolts O on the sides, pushed the sides down, the bolts slid into place and the little book-shelves were securely fastened together.

The giraffe is long-necked and awkward

Wild Animals for the Menagerie

Invented by Adelia Belle Beard

One of the Authors of Things Worth Doing

"'THE giraffe belongs to the ru-minant group of the—'" "Skip that, Polly. What I want is to know the kind of horns he has and how many toes. This picture doesn't show; it's no good for that, and while we are making the animals for our menagerie we may as well have them as nearly right as we can."

"To be sure, little brother. Well, here it is: 'The giraffe possesses two solid, bony ap-pen-da-ges'—that means horns, I suppose—'which are completely covered with the skin of the forehead, and are ter-mi-na-ted by a tuft of bristles.' Queer kind of horns, aren't they, Donald, with bristles sprouting out of the top?"

"That's all right. What about his feet?"

"Why—wait a minute, I've lost my place. Oh, yes: 'It's feet ter-mi-nate in a divided hoof.' There, he hasn't any toes, after all; just hoofs like a cow."

"How big does it say he is? We want our animals in the right proportion to one another."

Polly fluttered the leaves of her book; she had been taking a peep at some of the other animals. "It says this: 'The giraffe is the tallest of existing animals, and is usually from fifteen to sixteen feet high.'"

"That's measuring from the ground to the top of his head," commented Donald.

"It must be," returned Polly, "because he slopes so you would never know where else to stop in the measurement."

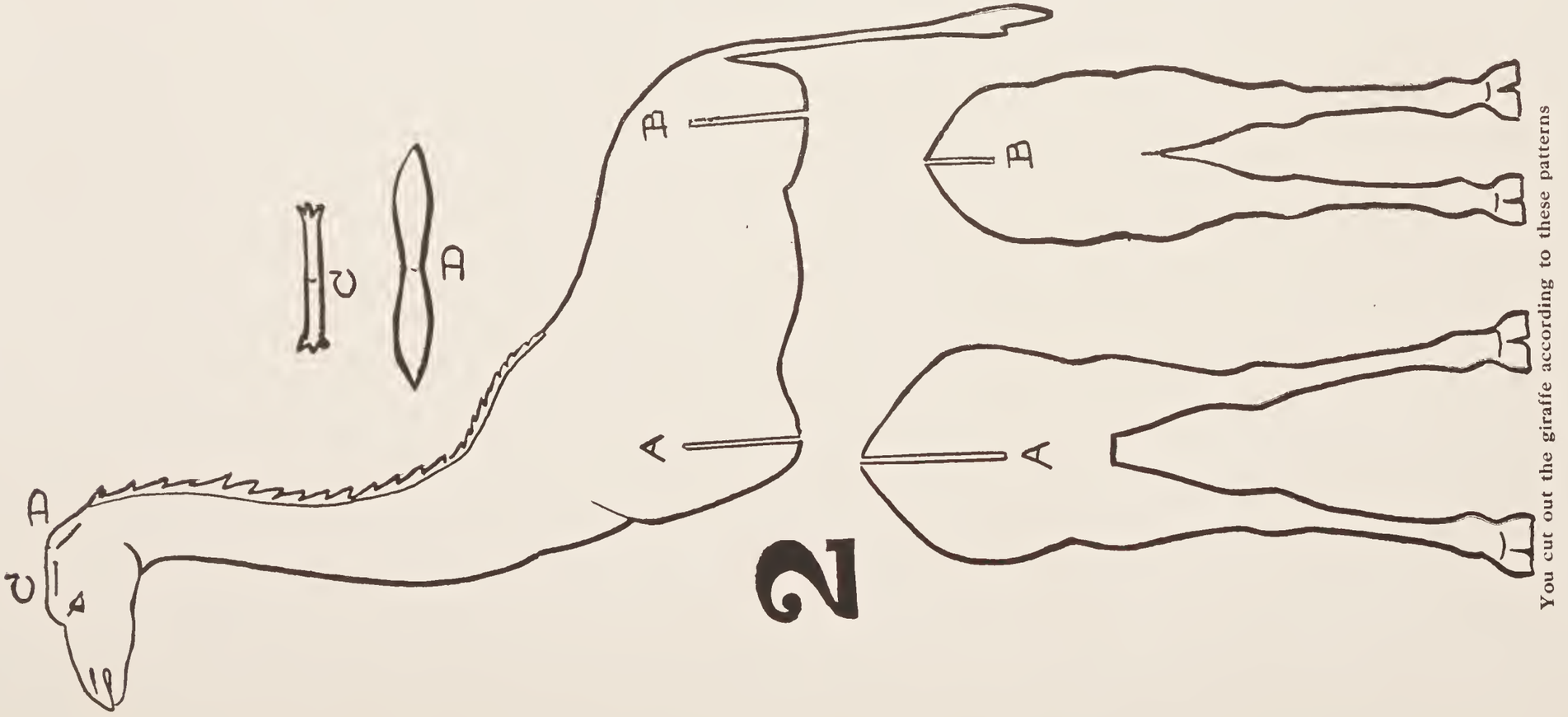
Donald worked away in silence, and Polly, with elbows on table, continued to read aloud. "It's dreadfully interesting, isn't it?" she said when she had finished the description of the giraffe given in Donald's natural history, "and it really would be a shame to make all the animals and not know anything about them except their names. I feel quite intimate and friendly with the giraffe now that I know what country he comes from and what he likes for dinner."

"There is your friend, then," said Donald, standing his little giraffe on the table (Figure 1.)

The various parts of the giraffe are shown in Figure 2. They are cut from cardboard and made to be put together by means of the slots. You can trace the patterns and make the animals without trouble.

The slot A of the fore legs fits into the slot A of the body, and the slot B of the hind legs fits into the slot B in the body. D is the pattern of the ears. The ears are to be put through the slit D in the head and then bent back, as in Figure 1. C is the pattern of the queer horns, the points on the ends represent the bristles. The horns are to be slipped through the slit C at the top of the head, and then bent in the middle to make them stand upright.

"He is just fascinating, Donald," exclaimed the ever enthusiastic Polly. "Don't you think it is quite as easy to make wild animals as farm animals?"



2

You cut out the giraffe according to these patterns

"Polly, you do ask a lot of questions. Go on and make the elephant now and let me read about him."

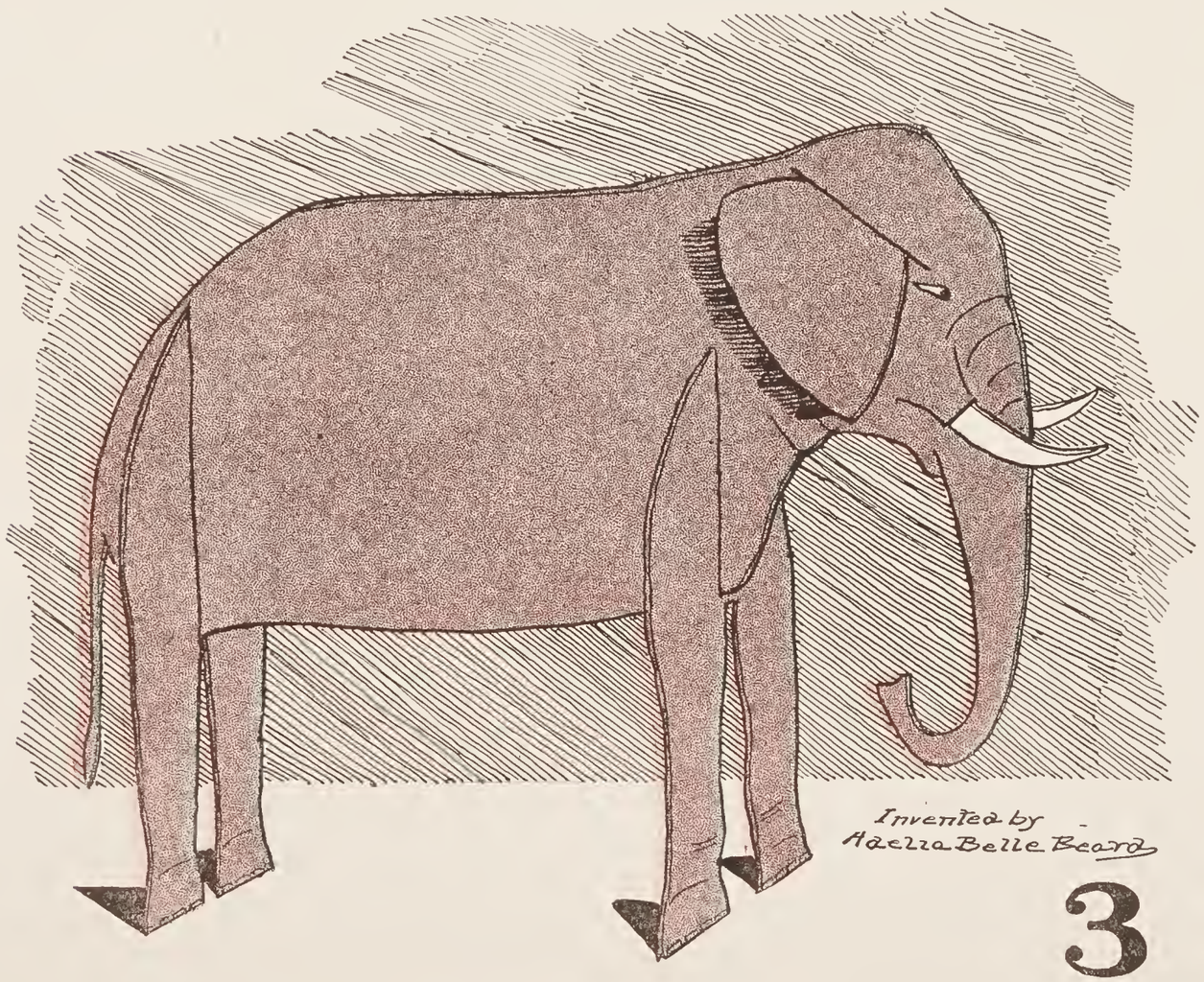
"All right," said Polly, quite ready to change occupations. "Where is that picture I saved? There, that is about the right size, isn't it?"

"Yes, it will do. Here we are," Donald continued, bending over his book. "'The elephant belongs to the order of Proboscidea—'"

"Now, Donald," Polly interrupted, "I don't want to hear that." "Yes you do; it means creatures with long noses, and the elephant has the longest nose on record."

"How long?"

"It says here: 'They are from six to eight feet long, and almost wholly composed of muscles, numbering nearly forty thousand.'"



"Isn't he a dear old fellow?" said Polly

"Forty thousand muscles in the poor thing's nose! Why, it makes me want to sneeze just to think of it. What else does it say?"

But Donald was watching Polly's scissors. "Don't make the hind legs so big, Polly; they don't look right."

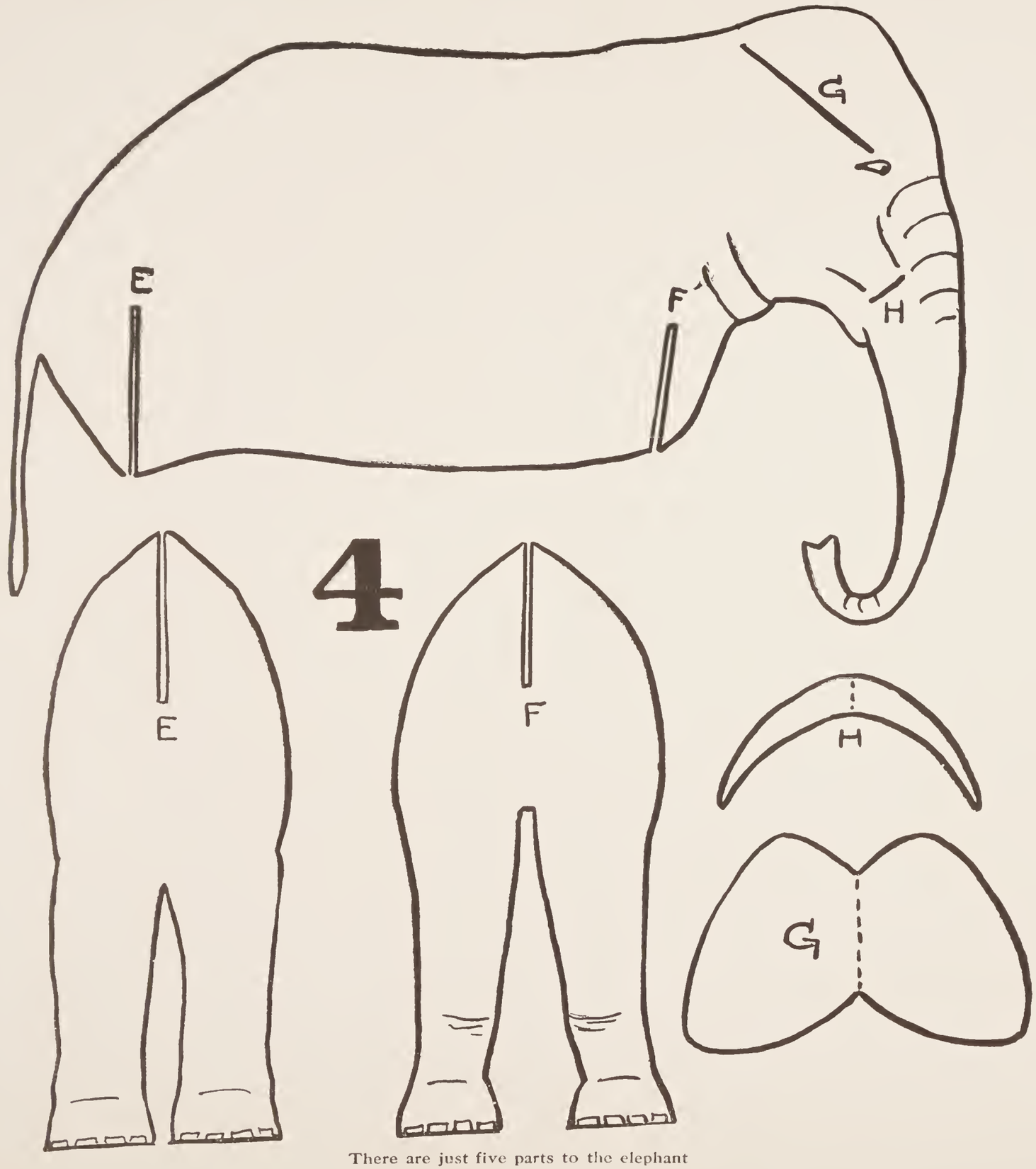
"An elephant's legs are big, Donald."

"Not like that. Let me trim them off for you. His back must slope more, too. Don't you remember how most elephants look, as though they were just going to sit down?"

"I think I will make the ears and tusks of writing paper instead of cardboard," Polly ventured, "They will be easier to manage."

"That's a good scheme. Have the ears large, for this elephant comes from Africa; and they can flop or stand out straight, and if you cut the tusks crescent shape they will turn up at the points."

"Isn't he a dear old fellow?" said Polly, standing her elephant on the table beside the giraffe. (Figure 3.)



There are just five parts to the elephant

The different parts of the elephant are given in Figure 4. They are lettered, and by putting the corresponding letters together the parts will fit perfectly. E fits E, F fits F. The ears G slip through the slit G, and the tusks H through the slit H.

The kangaroo (Figure 5) was the next animal the children made, and they were both delighted with its absurdly unequal legs and immense tail, which takes the place of another leg. Polly giggled a good deal over its great, long feet, and persisted in calling its fore legs arms.

"See how short they are, and since it doesn't use them for walking, they must be arms," she argued.

"Whatever they are, we will make them of writing paper and hitch them on as we did the elephant's tusks," said Donald.

Figure 6 gives the patterns for the kangaroo as Polly and Donald made it. They put the parts together according to the letters and bent the hind legs at the dotted lines for the feet, as shown in Figure 5.

Figure 7 is the camel, "whose legs are as humpy as its back," Polly said. Then she looked it up in the natural history and found out why it had

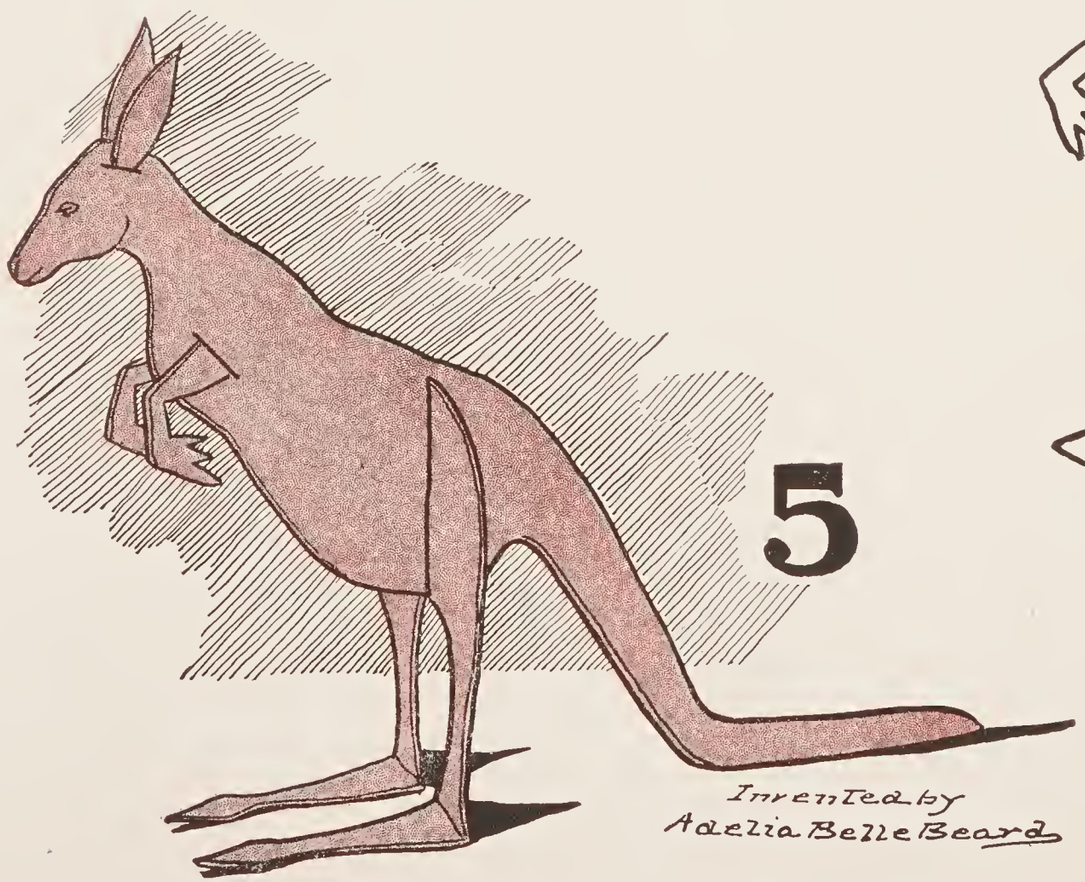
such peculiar legs, and also many more interesting things about this patient traveler. Figure 8 shows the various parts of the camel.

Donald made the rhinoceros (Figure 9.) Polly said she liked either pretty or funny animals. "I think the old duffer is funny," Donald returned. "See the horn on the end of his nose; doesn't it look just as though it had slipped down his head and he had caught it there?" Figure 10 gives all the parts of the rhinoceros.

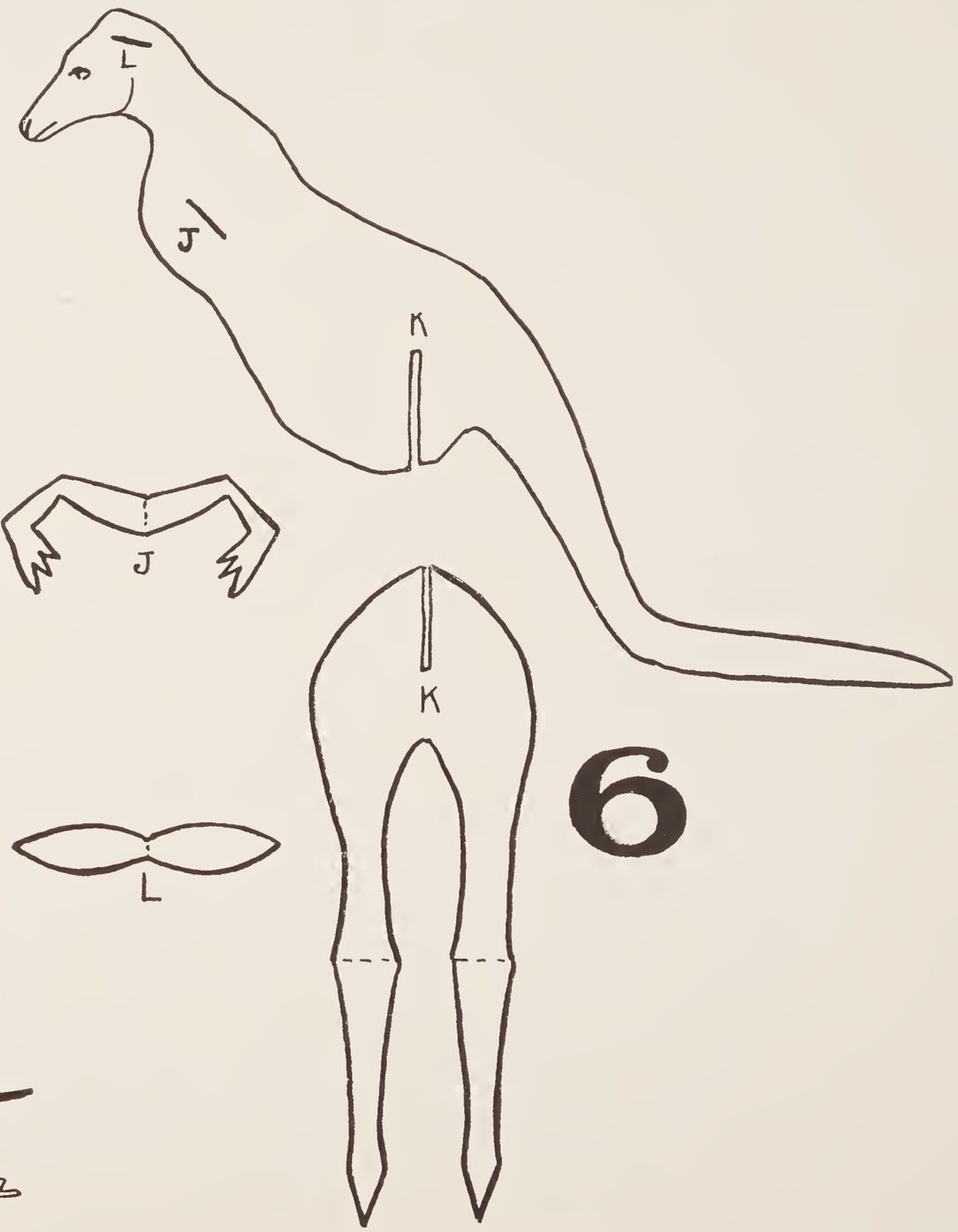
"The lion is a handsome fellow. You can make him, Polly, and I will see what I can do with the polar bear."

Polly made the lion (Figure 11.)

"He is switching his tail very angrily. Be careful not

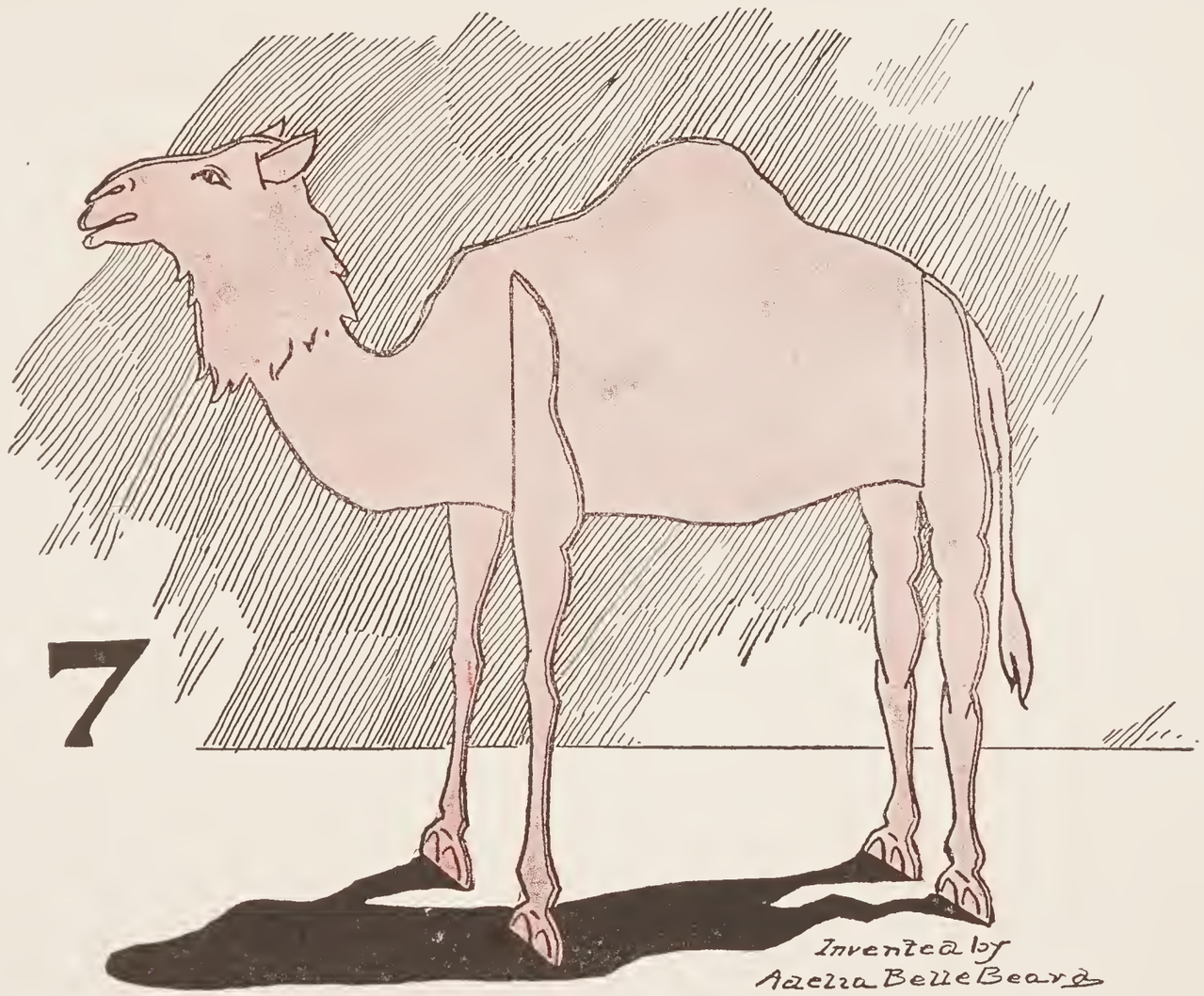


The children thought the kangaroo very funny

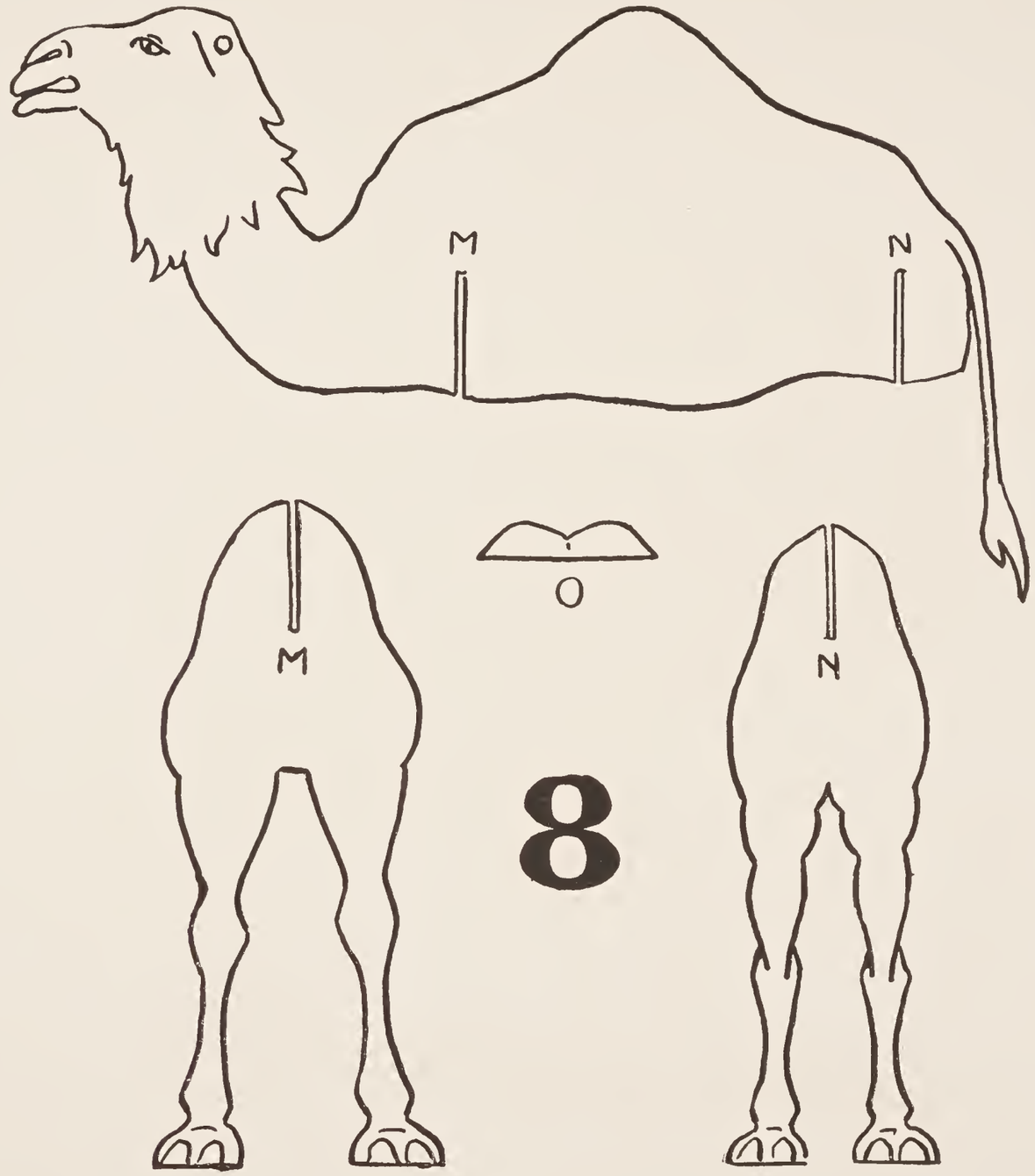


These are the parts of the kangaroo

to get too near him, Donald," she laughed. Figure 12 gives the four parts of the lion. Figure 13 is Donald's polar bear, and Figure 14 gives his body, legs and ears.



"The camel, whose legs are as humpy as its back"



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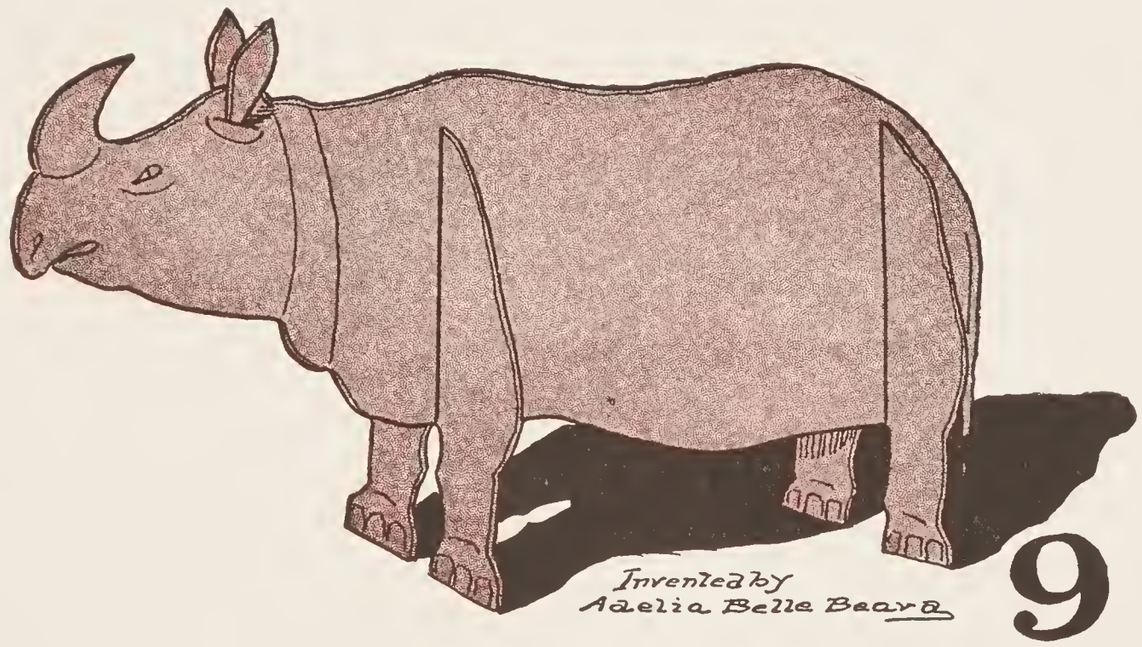
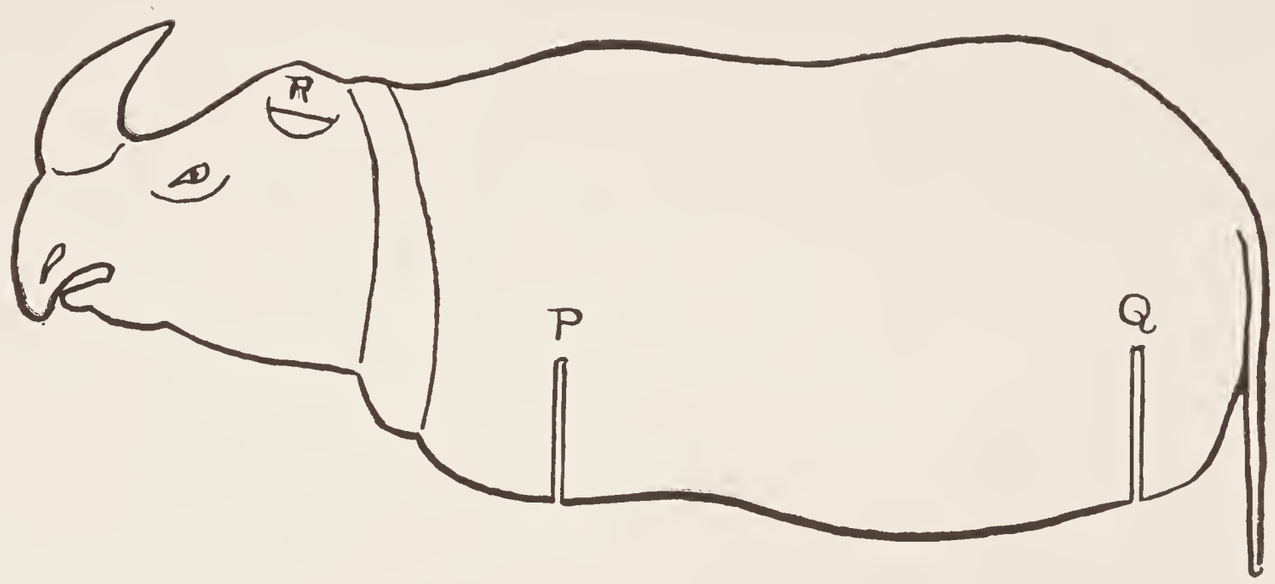
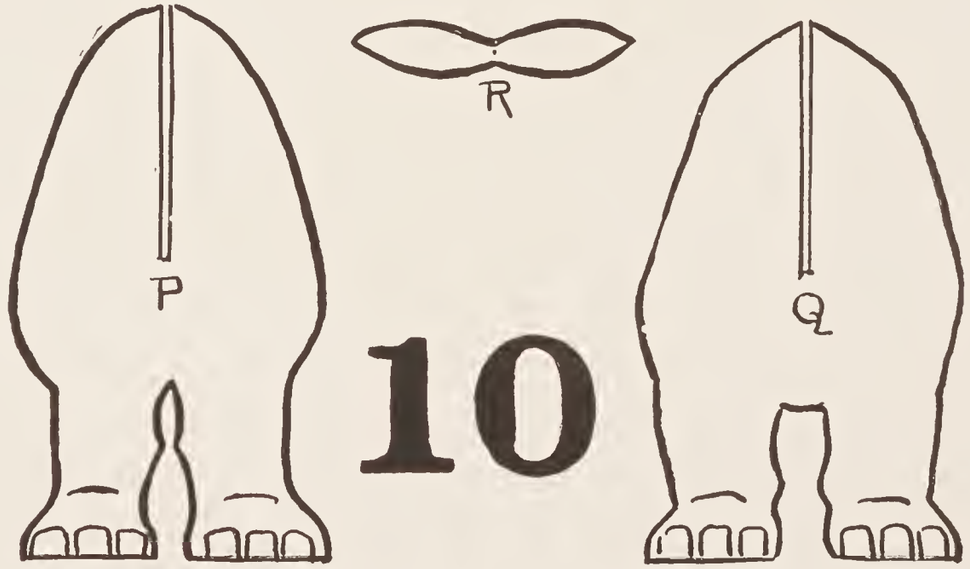
"He is a clumsy-looking creature, isn't he?" Polly remarked, "but I would love to see him roll up in a ball and tumble about in the water just for the fun of it, as your book says he does, sometimes."



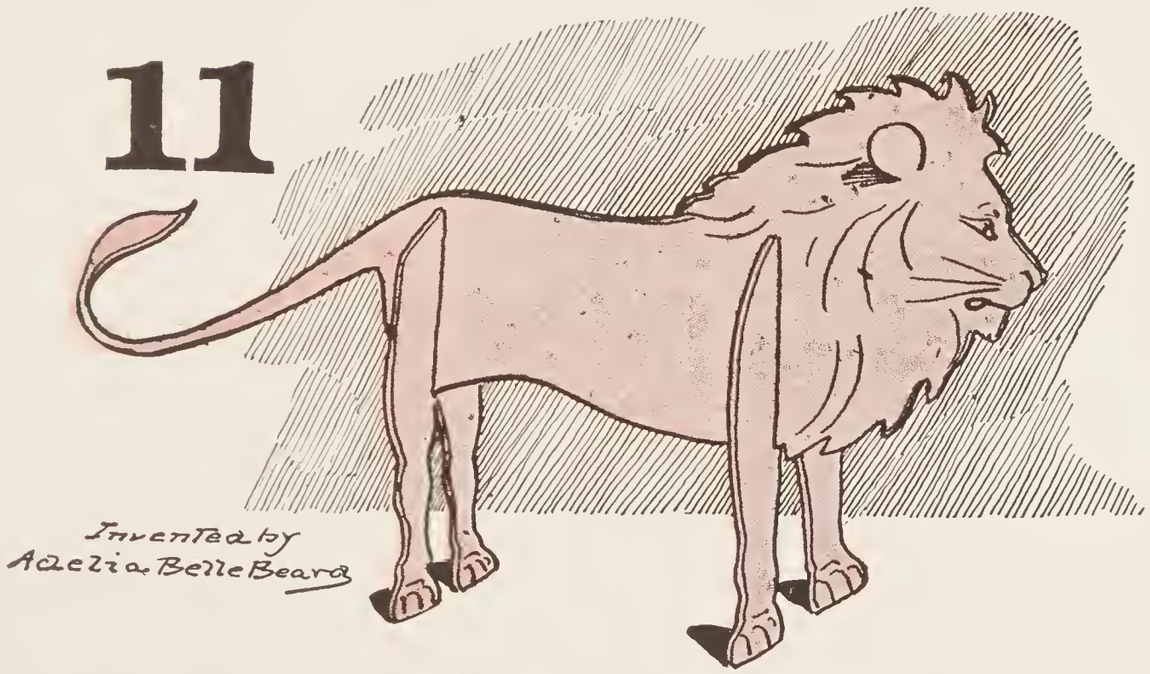
Here is the funny rhinoceros Donald made



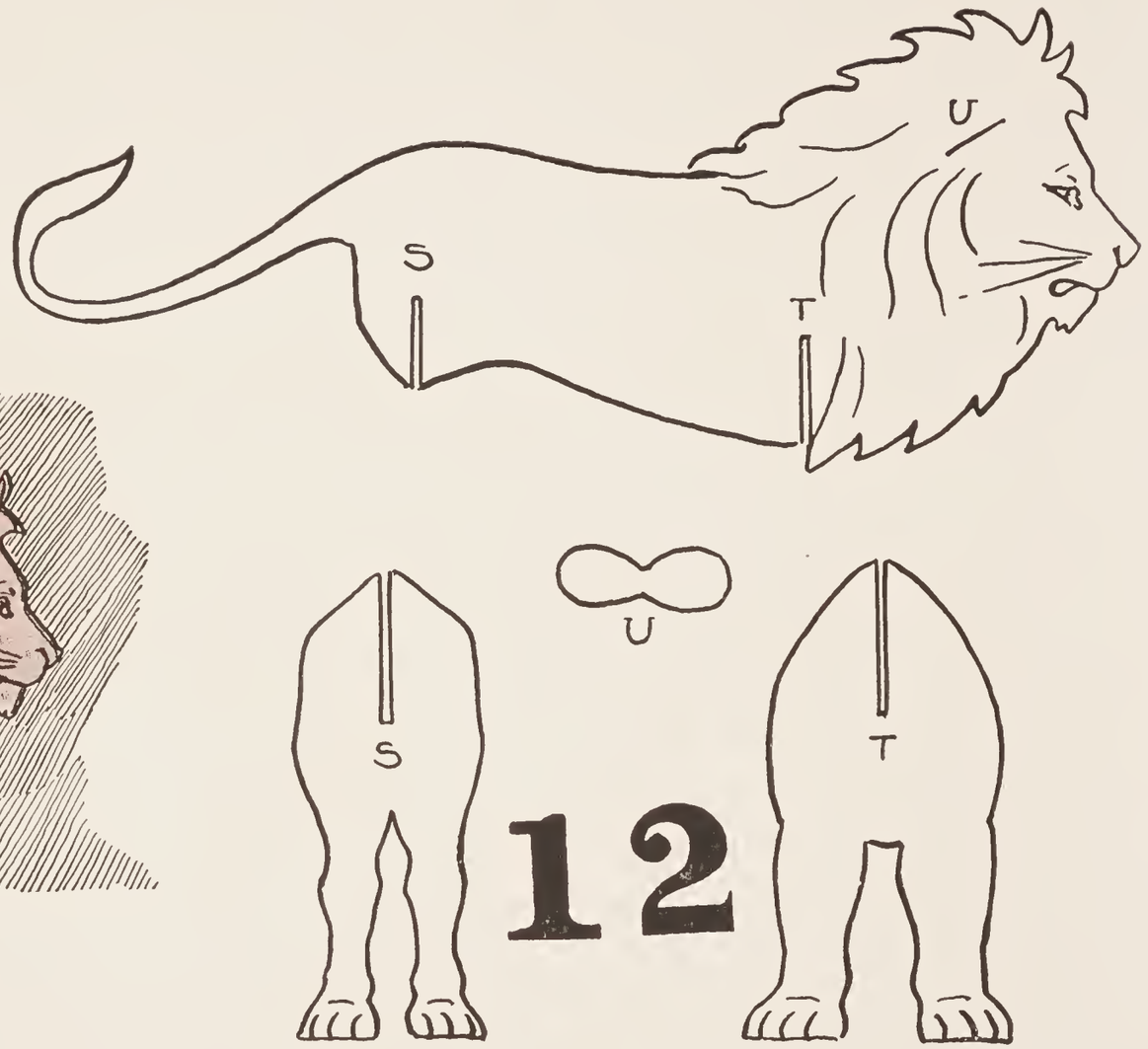


10

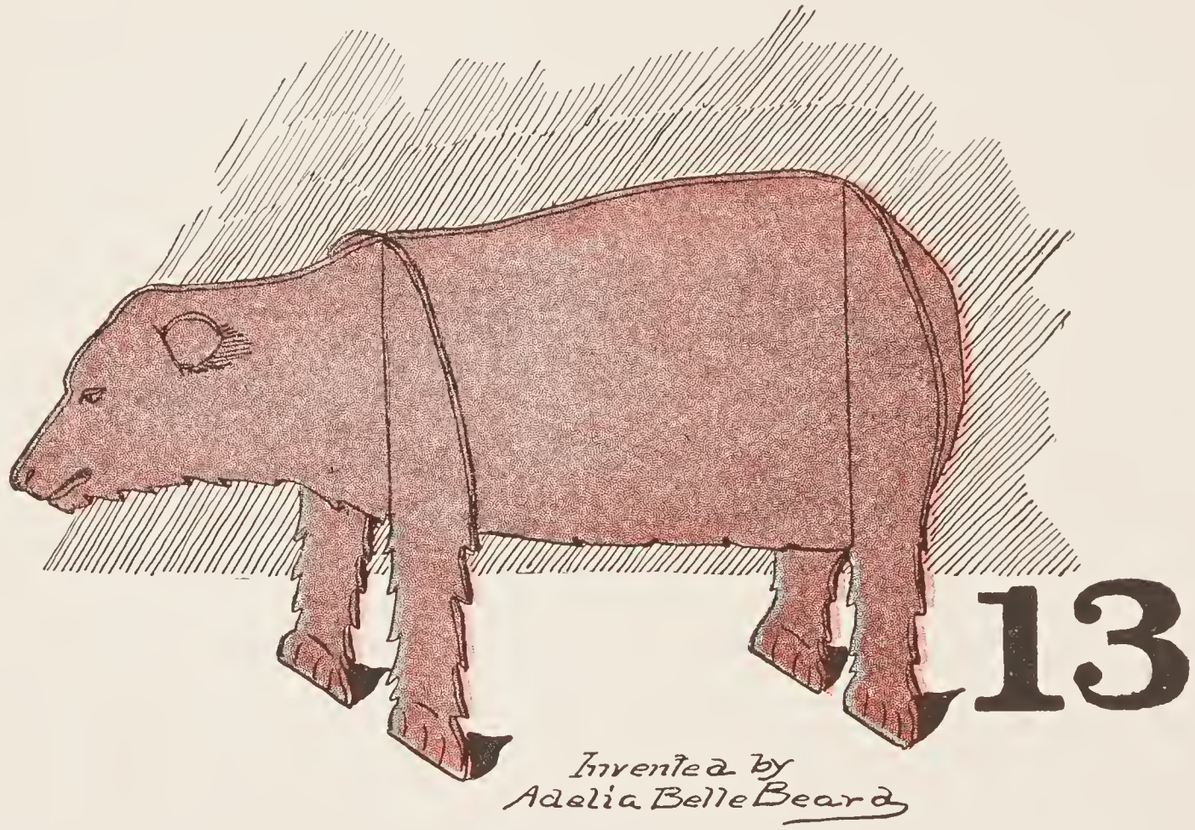
The rhinoceros takes but four parts



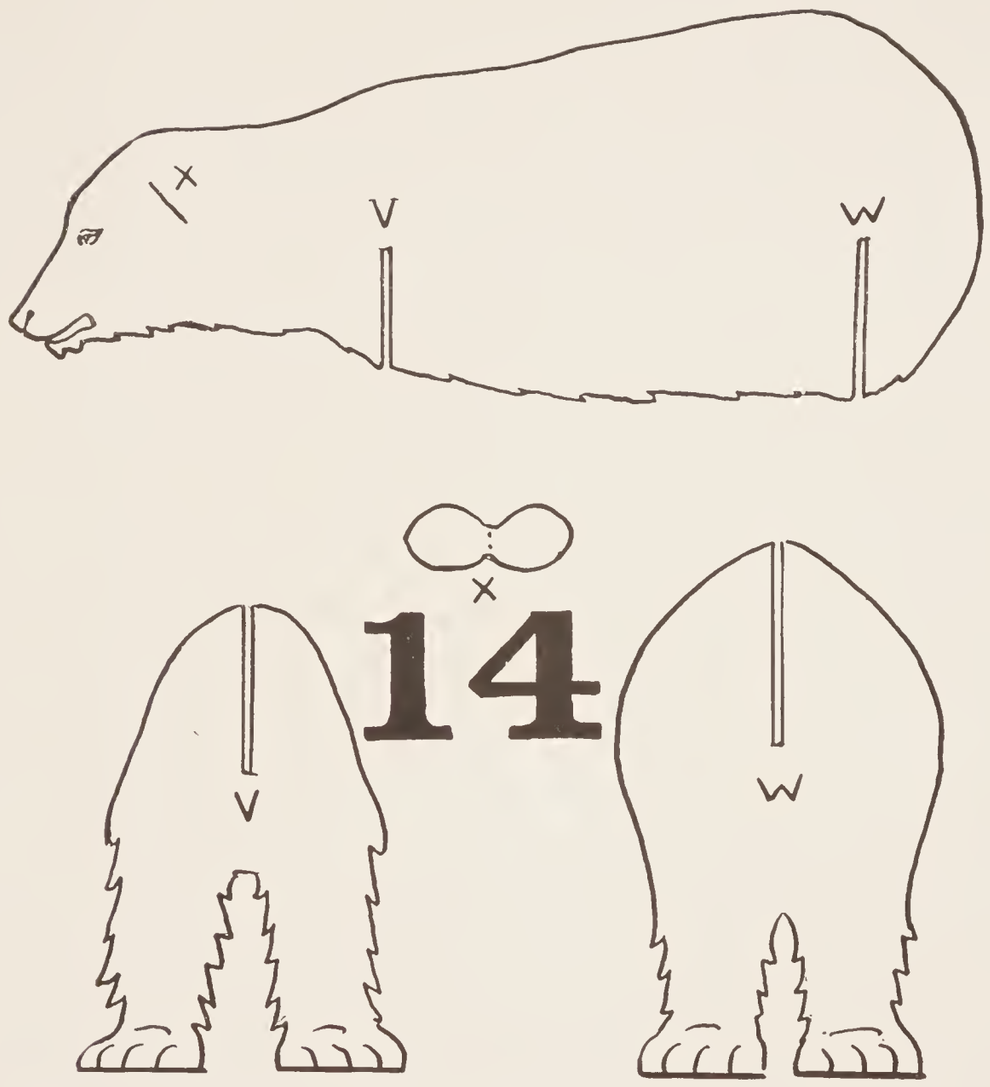
Polly made the lion



The lion is easily made in this way



The polar bear was left for Donald



14

The body, ears, fore and hind legs of the polar bear

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